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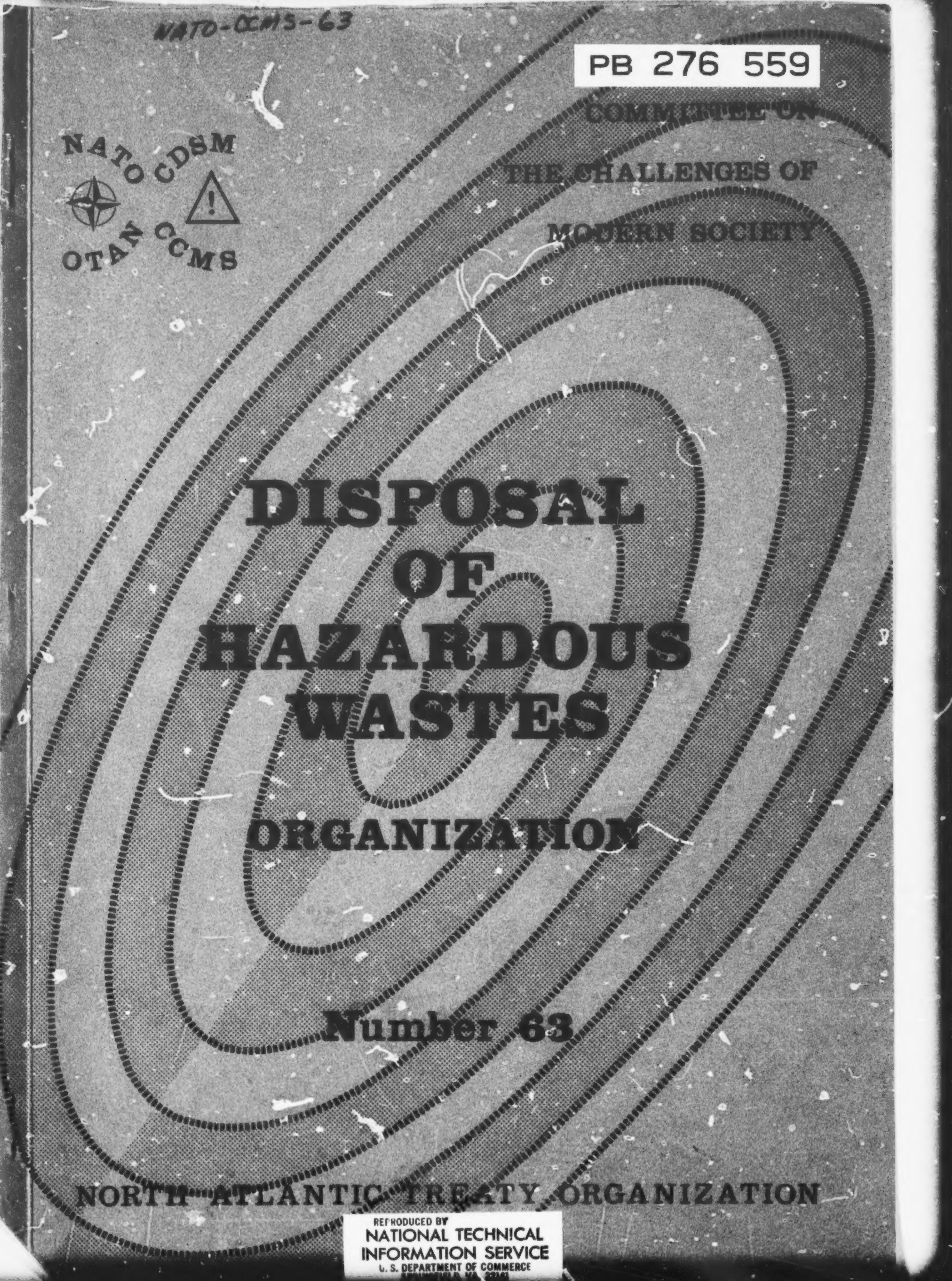

DISPOSAL OF HAZARDOUS WASTES

ORGANIZATION

Number 63

NORTH ATLANTIC TREATY ORGANIZATION

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Pilot Study

Disposal of Hazardous Wastes

Organization

Report prepared by the Federal Republic of Germany

Committee on the Challenges

of Modern Society

North Atlantic Treaty Organization

June 1977

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I. Introduction into the Sub-Project

Industrial wastes are often considered as the ugly counterpart of industrial progress. This sounds fatalistic but clearly we shall have to live with industrial wastes as long as we have industry.

The problem of industrial wastes, like environmental problems in general, draws increasing public attention and has become the subject of manyfold activities of governmental authorities, of commerce and of other groups of society.

These facts stimulated the NATO Committee for the Challenges of Modern Society (CCMS) in 1973 to carry out a pilot study on the problem of 'hazardous wastes'. Discussing the goals and tasks of the study it became clear that, amongst other items, the question of organization of hazardous waste disposal is of prime importance. Although disposal of wastes, recognized as 'hazardous', is in the first place a technological or a scientific-technical problem the disposal practice as such poses a multitude of organizational problems. These organizational problems can be solved in part by legislative measures, in part by other measures of administration and commerce.

1. Aims of the Sub-Project

At the time being the different national approaches to the problem of hazardous waste management are in flux. A rapid change of policies and detailed investigations in this subject characterize to-day's situation. Different countries have taken different measures to cope with the problems which generally are regarded as urgently to be solved.

Although most countries have already set up legislation on hazardous waste there is no general comprehensive legislation in this field covering all aspects of hazardous waste management. This is particularly the case in the field of

introducing specific types of waste disposal enterprises (either private or owned, initiated or subsidized by public bodies).
There seems to be a general uncertainty as to the direction hazardous waste management should be allowed and supported to develop and what decisions have to be taken at once and in the future to solve the problems - either by means of the free market backed by regulations to safeguard the interests of the public and of the environment - or by enabling public bodies to organize hazardous waste management as a whole directly. Most probably the appropriate way will lie in between these extremes.
This study therefore aims at giving a survey of organizational and legislative measures in the field of hazardous waste management in the different NATO-member countries not only in order to help national administrations to find their own way in solving their national problems by comparing different kinds of solutions but also to elaborate general principles which might be acceptable for all member countries thus promoting a harmonization of methods and standards for dealing with this problem.

To achieve this goal this Sub-Project tries to elaborate basic principles with regard to organization of hazardous waste disposal. These principles can, of course, only be of general nature, since as already mentioned particularly the organizational and administrative patterns vary in the different participating countries.

The aims of the Sub-Project are essentially as follows:

- Description, analysis and evaluation of the existing patterns of organization of hazardous waste disposal in the participating countries.

- Description of organizational possibilities.
- Description of questions requiring more detailed investigation, where recommendations cannot be given at the present state of knowledge and development.
- Reaching conclusions, where there is a common opinion on the evaluation of certain facts amongst the participating countries.
- Elaboration of recommendations in those fields, where sufficient knowledge already exists in the participating countries.

2. Subject of Investigation and Limitation of the Sub-Project

'Organization' means systematic formation of a limited sphere. The topic "Organization of Hazardous Waste Disposal" thus deals with questions concerning the formation of the respective sphere in a most general sense. It is thus not limited to governmental regulation but includes also this partial aspect in as much as the governmental 'function to order' is concerned.

From this definition of the term 'organization' the delineation and limitation of the Sub-Project within the boundaries of the pilot study is derived. The Sub-Project "Organization" treats questions of control, planning and execution of disposal of hazardous waste. It concentrates on the following aspects:

a. Legislative basis of organization of hazardous waste disposal, discussing i.a.
    - regulations on control of waste flows;
    - regulation on licensing of facilities;
    - planning regulations;
    - regulations on particular forms of organization;
    - regulations on liability, financing and insurance.

b. Practical execution of existing regulations according to a shall be described and analysed, also developments, which take place without governmental regulation by private initiative, e.g. waste exchange systems.

c. Evaluation of advantages and disadvantages of different organizational schemes, with special regard to the general waste disposal policies in the participating countries a task of particular significance for the elaboration of recommendations.

There are close relationships to other Sub-Projects, specially to:

a. "Recommended Procedures of Hazardous Waste Management"

Definition and Classification

The question of definition of the term and of classification of hazardous waste is of considerable significance to organization, too. A multitude of organizational measures require a viable definition and precise classification of the wastes in question. This is particularly so for planning, establishment and control of disposal facilities. Prerequisite for assessment of needs for facilities and capital investment is the analysis of waste quantities and disposal needs. Also for these tasks the subject must be clearly defined and the range of application must be clearly limited by a classification of hazardous wastes.

As to definition of hazardous waste it has to be mentioned that definition of hazardous waste is of greater importance particularly for this subproject, because the definition affects many aspects of organization.
The term 'hazardous waste' is a still undefined term at least in a juridical sense. Any waste can cause environmental hazards by its nature, composition and quantity

corresponding to the method of disposal. As the reports of the member countries show the term 'hazardous waste' is rarely used by national legislation.

National legislation defines:

- 'hazardous waste' (USA, Federal and State legislation)
- 'chemical waste' (Netherlands, Denmark)
- 'poisonous waste' (United Kingdom)
- 'toxic waste' (Belgium)
- 'special waste' (Germany, United Kingdom, France)
  The term 'special waste' describes a group of wastes for which special regulations apply with or without calling this group 'special waste'.

This sub-project does not try to work out a uniform definition leaving this to the project "Recommended Procedures". Reading the following parts of this report it has to be borne in mind however that all the above mentioned terms cover a more or less large group of wastes. These are generally described by a list which includes the wastes that are regarded as imposing potential hazards to the environment, i.e. "hazardous wastes" depending on quantity, situation etc.

Long-Term Care

The question of liability covers the problems arising out of long-term care and long-term liability particularly for landfill disposal too. These areas will be covered by the Sub-Project "Recommended Procedures" in detail. This report describes the respective problem areas shown in the national reports only and does not go into detailed evaluation.

b. "Transportation"

The transportation of hazardous wastes deserves particular consideration in organizational schemes, for

- transport is a critical point in every control system;
- transportation generates costs;
- further organizational problems are linked to transportation.

These questions will thus be treated by the Sub-Project "Organization", while the Sub-Project "Transportation" proper will deal with problems of safety of transportation of hazardous wastes.

3. Preparation and Disposition of this Report

The Pilot Country Federal Republic of Germany outlined its conception of content and objectives of the Sub-Project "Oragnization" for the first time at occasion of the expert meeting in Ottawa, June 2 - 5, 1975. In fulfillment of a commitment made there, a written definition of the aims and content of the Sub-Project was forwarded to all participating countries in August 1975. A questionnaire was attached to the definition to serve as a guide for national contributions to the topic to be prepared by the participating countries.

Questionnaire

Sub-Project "Organization of Hazardous Waste Disposal"

1. Legislative and regulatory basis of hazardous waste disposal organization

1.1 Which are the provisions regulating the responsibility for waste disposal by

- public bodies?
- private enterprises and companies (corporations)?

1.2 Which are the control mechanisms with regard to generation, collection, transport and disposal?

- are these controls ordered by regulation or are they voluntary?
- how are these controls applied and how are they checked?

1.3 Which conditions have to be met to get a license for collection, transport and for running a disposal facility?

1.4 Which are the provisions concerning

- liability?
- insurance?
- financing?

1.5 Are there regulations for

- setting up waste disposal plans (collection, transport, disposal) of local, regional and countrywide range taking into consideration inter alia
  1. Collection sites?
  2. Central treatment and disposal facilities?
- tuning these disposal plans to each other?

1.6 Are there special regulations in the sense of questions 1.1 to 1.5 for some groups of hazardous waste like

- waste oils?
- hardening salts?
- solvents?

2. National state of the art with regard to organization and management systems.

2.1 Which management systems exist

- on public law
- on private law

and how do they work?

2.2 Who is running these management systems?

- public bodies or authorities?
- corporations (private or public)?
- private enterprises or companies?

2.3 How are public and private responsibilities combined?

- Are there disposal companies run by both private and public holders?

- How are private and public interests distributed?
- How is the problem of financing solved?

2.4 According to which criteria are disposal districts established and limited (for a certain disposal organization unit)?

- Is there a free choice of disposal facilities or is the disposer of hazardous wastes obliged to use fixed disposal facilities (sites)?

- Is there a regional or countrywide collaboration of different organization systems (units)?

2.5 Are there special management forms for the disposal of single groups (see 1.6) of hazardous wastes?

2.6 Are there "waste exchanges" for purposes of waste reutilization and how do they work?

3. Analysis and evaluation of hazardous waste management systems.

3.1 Which experiences have been made with the management systems under 2 ?

3.2 Are there new management concepts on the national level for hazardous waste disposal?

3.3 Which recommendations can be made for improving hazardous waste organization?

The following member countries responded to the questionnaire:

- Belgium
- Denmark*)
- Federal Republic of Germany
- France
- Netherlands
- United Kingdom
- United States of America.

Some of these countries added extensive supplementary material to their replies to the questionnaire which was evaluated and was of considerable value in elaborating the third part of this report.

A first draft interim report on this sub-project was discussed at a joint session of the group of experts in Bonn on May 10 - 13, 1976. That first draft did not include though, the French and Danish contributions.

At the occasion of the mentioned joint session supplementary questionnaires were distributed to the member countries where given information seemed to be incomplete or where new questions arose during the drafting of this report. This procedure proved to be very useful particularly to get detailed information as to the political assessment of the problem in the member countries. The draft final report was circulated in October 1976 and revised according to the comments of the participating countries.

This draft was amended and passed at the Pilot Study Group Meeting in Washington in May 1977.

This report is divided into four sections including the introduction. Part II gives a summary of the national reports to the questionnaire and the additional informations the pilot country received during and after the joint session of May 1976.

Part III includes the evaluation of results, part IV the findings i.e. conclusions and recommendations. This disposition of the report had to be chosen because the different national contributions were not comparable as to the information given but also as far as the different legal and practical approaches are concerned. It therefore seemed more appropriate to separate the reporting and evaluating parts than to sum up the different national reports together with the evaluation of results. The method used will also make it easier for the reader to extract specific information on the different national approaches and to distinguish between facts and opinions.

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*) As agreed in the plenary session in Bonn, May 10 - 13, 1976 Danish experiences and conditions were included in this sub-project. The information necessary for dealing with the Danish approach to hazardous wastes organization was obtained by German experts by means of interviews of Danish government officials and operators of the central plant at Nyborg.

II. Hazardous Waste Management in the Participating Countries

1. Management Principles and State of the Art

Belgium

Both public authorities and private enterprises may deal with waste disposal. No difference is made between these two. Any enterprise dealing with the disposal of toxic or non-toxic waste and thus might cause hazards to the public health or to the environment is regarded as dangerous according to the General Regulation on Labour Protection (Règlement Général sur la Protection du Travail). It is subject to authorization which is given by the regional authorities on notification to the concerned ministries and which is in general accompanied with conditions relating to the operation of the plant.

There exists no general organization for the disposal of toxic wastes. Waste producers may use an authorized disposal enterprise of their choice.

The Act on Toxic Wastes of 22 July 1974, the administrative regulations of which are underway provides for the establishment of a company on public law which has the commercial task to sponsor the creation, reorganization or extension of enterprises engaged in destroying, neutralizing or disposing of hazardous wastes or assuring hazardous waste management.

The new legislation has not yet been practically applied. Privately owned facilities, however, are being created. Their technical and financial conditions are laid down by a special licensing board established by Art. 8 of the Royal Decree of Febr. 9, 1976 - general regulations on toxic wastes. This decree was enacted according to the Act on Toxic Wastes. Additionally waste producers have to notify their wastes periodically. They are allowed to pass them on only to a disposal facility licensed by the Ministry of Employment and Labour on advice by the mentioned licensing board.

Denmark

The basic conditions for hazardous waste disposal are set by the following regulations:

1. The Environmental Protection Act, No. 372 of 13 June 1973
2. The Act on the Disposal of Waste Oil and Chemical Waste, No. 178 of 24 May 1972
3. The Statutory Order on the Disposal of Waste Oil, No. 455 of 17 Oct. 1972
4. The Statutory Order on the Disposal of Chemical Waste (CWR), No. 121 of 17 March 1976.

Organization of hazardous waste disposal is based on the principle that the major duties under these regulations are given to the "Kommunes" i.e. the lowest level of regional authorities in Denmark.

Organization of chemical waste disposal started with copying the existing system for waste oil disposal established in Denmark since 1972. To provide an effective service Denmark was already covered with a net of collection places for waste oil. These places are run by the "Kommunes".

Although there is no legally binding obligation for the "Kommunes" to establish plants for hazardous waste disposal (the Chemical Waste Regulations do not include a principle decision towards a disposal system provided by public authorities) there was an urgent need for such facilities, a need which was not properly met by industrial or other private activities. This was one of two main resons why a cooperative organization, the "Kommunekemi AG", in form of a stock corporation limited by shares was founded by the "Kommunes" in order to provide a comprehensive hazardous waste management. The other reason was that new legislation was about to impose specific duties on the "Kommunes" in the field of chemical waste management which the authorities had no means to fulfil. It has to be noted however that these duties did not include an obligation to provide treatment and disposal facilities. The "Kommunekemi" runs one central treatment /disposal plant at Nyborg in the geographic centre of Denmark. This facility is connected by rail with a net of receiving stations evenly spread all over the country. At the time being this net consists of 15 receiving stations; 4 further stations are being planned. The maximum distance from any place in Denmark to the nearest receiving station does not exceed 50 km.

Using railway connections and receiving stations is a very important detail in the Danish model of hazardous waste management, transportation being included in the disposal fee. Thus an even price level is guaranteed wherever the waste might be produced. On the other hand, cautious storage and safe transportation of wastes being achieved by means of a comprehensive collection and transportation scheme at low fees, external control can be minimized, not having to take into account long distance transportation by private enterprises.

The "Kommunekemi" provides a comprehensive service including incineration, detoxification and landfill disposal, that covers about 98 % of hazardous wastes being produced in Denmark. There are negotiations to solve the problems connected with highly toxic wastes that cannot be treated within the plant by underground disposal. These wastes are at present stored on the premises.

Federal Republic of Germany

All organizational questions arising from the Federal Act on the Disposal of Wastes of June 1972 as amended in April 1976 are regulated by the Lander (States). The Act provides for the main obligations. It decrees that waste may only be treated, stored or disposed of in facilities or plants (waste disposal plants), which are licenced for this purpose. This law gives the basis for organized waste disposal in the Federal Republic of Germany.

Public bodies have recently been charged with the execution of special-waste disposal where private enterprise proved unable to sufficiently provide for disposal capacities. Some manufacturing corporations aside, the initiative of private enterprise to develop organizational models for operation of special-waste disposal facilities lagged behind the needs. Generally efforts by private enterprise were hampered by problems of financing and management. A solution to this problem became pressingly urgent, when some incidents of improper dumping of hazardous wastes alerted the public to the problem connected with special-waste.

On the other hand transport of hazardous waste, different from disposal, is exclusively practised by private enterprise. In this sector public administration confines itself to enact and enforce statutory regulations and control measures.

In principle the producer of waste has to forward it to the responsible public body for disposal. This public body is designated according to Lander (State) legislation. The public body responsible for waste disposal, after having obtained the agreement of the competent authority, can exclude those wastes which cannot be co-disposed of with residential waste because of their kind or quantity. For the disposal of excluded wastes the producer remains responsible. He may, however, contract a third party for the disposal of his waste, no matter whether the waste was excluded from disposal or not, whenever the Lander regulations open this way.

In general 'hazardous wastes' are excluded from disposal by the public bodies. These wastes therefore are, generally speaking, being disposed of by a third party. As to this 'third party' the Waste Disposal Act does not provide for any organizational regulation. Any legally acceptable type of organization is possible, i.e. disposal facilities operated by industrial enterprises, cooperative efforts of waste producers and public authorities towards establishment of disposal organizations by the creation of 'Special-Waste Companies', establishment of co-operatives of the public bodies responsible for waste disposal in general, and private disposal enterprises.

The executive regulations of some of the Lander provide that they may create, take over or take part in particular institutions for the disposal of special-wastes. Furthermore some executive regulations explicitly provide for the possibility that all public bodies obliged to disposal join up to co-operatives.

The disposal of special-waste is being executed and supervised on the state level. The statutory regulations do not prescribe a uniform or definite organizational structure. For the time being the disposal of special-waste follows different organizational schemes:

Organization under public law

a. Disposal by the bodies responsible for waste disposal in general

b. Disposal by co-operatives (e.g. municipal co-operatives)

Solutions under private law

c. Disposal by the producer of the waste; e.g. in the case of exclusion from disposal by the responsible public entity

d. Disposal by private waste disposal enterprises

Mixed organizational forms

e. Disposal by special-waste disposal companies under participation of public bodies and private enterprises.

The following trends can now be observed:

One group of Lander aims at organizational systems in which the government takes a main part in companies under private law (so-called 'special-waste companies', mostly in the form of limited liability companies). Another group of Lander tries rather to profit from already existing facilities and organizational structures and to ensure this way that a sufficient number of waste treatment and disposal facilities is offered by the combination of facilities owned by industry, by public bodies and by private disposal enterprises. Transfer of waste across interstate boundaries is generally not a problem; only far distances may be a limiting factor.

The organizational forms a through d listed above may be characterized as follows:

a. Disposal by bodies responsible for waste disposal in general

The public bodies held responsible for disposal of waste in general (particularly residential waste) are determined by State law. According to the present regulations they are generally the "Kreise" (districts) and cities. There the competent authorities are put in charge for waste management and orderly disposal.

However, there exist only few special-waste disposal facilities in the Federal Republic of Germany operated by public bodies of that kind. This is due to the fact that disposal of special-waste requires coverage of large areas, i.e. over-regional solutions, for the following reasons:

- high costs
- difficulties in site selection
- profitability requires large amounts of special-waste along with a sizeable region to be covered for this type of specialized [illegible]cility.
- hazardous wastes are more mobile.

Operation of its own facility may be useful for a public entity if there exists in its area a multitude of small and medium-sized manufacturing companies which are themselves not able to construct and maintain their own disposal facilities and which produce special-wastes of a similar kind. For example there is a local concentration of electroplating shops in a certain city or district. In such a case the disposal facility generally is designed to accomodate certain types of special-waste only.

For facilities of public bodies the following regulations commonly apply:

- Compulsory use; i.e. companies located in the area in question and producing a certain type of special-waste are compelled to use the facility for disposal of their wastes.
- The producers of a type of special-waste may have to pay once a contribution to the construction of the facility. Costs for operation are covered by users fees corresponding to the amount of the wastes to be disposed of. Special fees for particular services may be levied in addition.

b. Disposal by co-operatives

Another possible organizational form for the disposal of special-waste solely under public law is the co-operative. The respective state legislation provides for its statutory basis. A co-operative is a joint venture of regional entities (with respect to waste disposal these are generally districts and cities) to cope with common public tasks. The co-operation may be voluntary or by order of a higher authority.

One example for a co-operative is the Zweckverband Sondermüllplätze Mittelfranken, Bavaria, with its disposal facility at Schwabach. The membership of this co-operative includes 5 cities, 7 districts (Kreise) and

7 additional towns and communities in an area equivalent to one administrative county with about 1.5 Mill. inhabitants. The facility at Schwabach is designed to dispose of nearly all types of special-waste. The waste producers of the district are obliged to deliver their wastes to the sites prescribed by the co-operative. In addition wastes are also accepted from non-members from outside of the county.

Installations set up by the co-operative required investments of DM 14 Mill. This amount was raised in the following manner:

- the county contributed DM 0.5 Mill., the State of Bavaria DM 1.7 Mill.
- the members of the co-operative contributed DM 0.6 Mill.
- DM 3.4 Mill. were raised in form of a low-interest rate loan (2 per cent below capital market rate of interest)
- the remainder of about DM 8.5 Mill. was raised at the capital market.

The co-operative covers the running expenses by users fees and needs no subsidies.

c. Disposal by producers of waste

When special-wastes are excluded from disposal by public bodies, the owner of the waste himself has to take care of its disposal. A certain number of corporations, especially of the chemical industry, managed to establish own disposal facilities.

One corporation, for instance, developed and operates the following system. Waste disposal is organized for the entire plant by a special waste management division responsible for all branches of production and services. This division has to be consulted at an early stage for all pertinent problems, particularly before introduction of new or alteration of existing production processes and development of new products. This way the proper disposal of possibly arising wastes will be assured before starting a new production process. Wastes which can be recycled or profitably sold are collected separately, e.g. scrap metal, paper etc.

Decision on the appropriate disposal method is passed on the basis of a rough classification as follows:

- residues for incineration in the own incineration plant on site;
- residues for incineration in external plants, e.g. incineration of chlorinated organics at sea;
- residues for disposal at a landfill controlled by the corporation;
- residues for deep mine disposal.

Each type of waste gets a code number for internal identification. For allocation of the code detailed data on type and composition of the waste have to be furnished by the shop, possibly with the assistence of laboratory personnel. The code must then be indicated whenever the necessity for disposal of the same type of waste is announced to the waste management division.

Waste management of corporations with their own disposal facilities is frequently optimally organized from the technical viewpoint as well as from the aspect of business administration. The control system often is much better than that of pub'ic bodies because of the better technical facilities, e. g. analytical laboratories, and particularly skilled personnel.

d. Disposal by private disposal enterprises

A considerable portion of the special-waste disposal in the Federal Republic of Germany is carried out by treatment and disposal facilities run by private enterprises. This applies also to regeneration and disposal of waste oil and solvents, and there exist a number of industrial companies capable of recycling and reusing still other residues from production processes. When wastes are treated by industrial companies the appropriate plants are integrated in the company organization.

For this form of organization two examples are worth mentioning. A manufacturing company at Hamburg, which i. a. produces sulfuric acid operates a processing plant for acid tar. This disposal facility is mainly supplied by petroleum refineries in the area, which generate the tarry residue by the production of certain types of lubricating oil. As far as our information goes construction and maintenance of the disposal plant are financed by its users.

Another remarkable organizational form of waste disposal is the deep mine disposal facility at Herfa-Neurode. Here primarily hazardous wastes are disposed of, such as used hardening salts , cyanides, organo-mercury compounds, arsenical wastes, distillation residues from chlorination of hydrocarbons, pharmaceutical wastes and the like.
As in the first example the waste disposal undertaking is an autonomous division of the potassium mining company which owns and still exploits the mine. To be accepted for disposal in the mine each waste has to be analysed and evaluated individually. It is the manufacturer directly responsible for the chemical process of pro-

duction and thus knowing best the waste in question, who is requested to furnish all necessary data on type and composition of the residue.

Private disposal enterprises in Germany may be structured in every legal form permissible under the civil law. In most cases the legal form of a limited liability company (Gesellschaft mit beschränkter Haftung, GmbH) is chosen. For these the law stipulates a stock fund of only DM 20,000. First experiences imply, however, that the small liability capital may not give sufficient coverage, if facilities are operated in a disorderly manner or when it comes to reclamation and recultivation of landfill sites.

e. Disposal by special-waste disposal companies

In some Lander (States) special companies have been founded for disposal of special-wastes with the active participation of the State governments. Goals and organization of these companies shall be demonstrated by the example of Bavaria. The Company for Disposal of Special-Waste in Bavaria (Gesellschaft zur Beseitigung von Sondermüll in Bayern mbH, GSB) was established in 1970. Its basic stock fund amounts to DM 1 Mill. and was raised as follows:

- the State of Bavaria contributed DM 0.4 Mill.
- municipal co-operatives contributed DM 0.3 Mill.
- 25 industrial companies contributed DM 0.3 Mill.

A recent increase of capital was borne by the State government alone.

The activity of the company is conducted on a public welfare, non-profit basis and is principally limited to the territory of Bavaria, though wastes from outside of this state can be accepted. One third of the members of the board of trustees is chosen among State representatives, one third among representatives of the municipal co-operatives and another third among representatives of the municipal co-operatives and another third among representatives of industry. In this way also the public bodies have a certain influence on the management of the company, which has the above discussed legal form of a limited liability company (GmbH).

The GSB operates a network of regional collection and pretreatment facilities, too, where volume or weight of wastes can be reduced to prepare for long-distance transport to the central disposal plants. At present eight such collection points and four special-waste disposal facilities are in operation or under construction, while the draft Special-Waste Disposal Plan of the State provides for a total of 23 regional collection points.

Similar concepts for the disposal of special-waste as in Bavaria exist in Baden-Wurttemberg, Hesse, Lower-Saxony and Rhineland-Palatinate.

The management forms already practised in the Federal Republic of Germany seem to be useful. The existence of organization at forms both on public and on private law did not bring practical problems. The reason for this might be that there is no surplus of disposal facilities for hazardous wastes for the time being. The future will show whether this 'open' management concept will lead to competition between private and public site operators on the long run. This could bring demand for further regulations.

To improve hazardous waste management in the Federal Republic of Germany it is considered to be essential to develop systems for classification and evaluation of hazardous wastes.

Special attention is attributed to the installation of collection and reloading points. These facilities can be regarded as a considerable relief for disposal facilities if they are combined with pretreatment plants (for dewatering and detoxification). Using collection points can diminish the costs for transportation and this way ensure an equal financial burden for all waste producers.

The installation of such sites will also make it easier to supervise hazardous wastes and lead to a better use of transport capacities as far as wastes are concerned that occur in small quantities (e. g. hardening salts).

The Producing industry will no longer be forced to collect and store hazardous wastes within their plants for long periods.

France

The legal framework for waste treatment has been created by the Act of 15 July 1975 concerning waste disposal and recycling.

Public bodies are not directly responsible for the disposal of hazardous wastes. The Act of 15 July 1975 charges the local authorities with waste disposal which comprises essentially domestic wastes and those comparable to them. The disposal of hazardous wastes lies principally within the responsibility of the producer and of private enterprises dealing professionally with it.

The policy to be pursued in the field of waste treatment is carried out within the framework of the regulations defined by the public authorities and of the possibilities given by the activities of the "agences de bassin" and the forthcoming establishment of a national agency for recycling and waste disposal. The "agences de bassin", numbering six, are public institutions which have been established in connection with the Water Act of 1964. Their task is water pollution control, particularlv by imposing taxes on the polluter. The funds are then distributed by government sponsorship among those who carry out projects to control water pollution. The National Agency for Recycling and Waste Disposal - a public institution of industrial and commercial character - will be charged with defining, facilitating or conducting the activities aiming at waste disposal and recycling. This authority has been established by decree No. 76 - 473 of 25 May 1976 together with a consultative body, the National Committee for Recycling and Waste Disposal.

Within the scope thus defined private initiative is completely free to get engaged in waste disposal activities, for instance by establishing centres for waste treatment. Waste treatment centres may be established on initiative either of private disposal enterprises (possibly including nationalized enterprises dealing with disposal) or of waste producer associations.

Netherlands

The management of hazardous waste under the Chemical Waste Act (CWA) is considered a normal industrial activity.

Management systems are and should therefore be based on private law and run by private enterprise. In one case local and regional government employs such a private enterprise as shareholders.

Thus responsibility for hazardous waste management is put primarily with industry (i.e. private enterprise), under particular control of the central government (Ministry of Public Health and Environmental Hygiene), cf articles 3, 4, 8, 31 and 35 of Chemical Waste Act. At present there is no combination of public and private responsibilities.

The experiences with the above mentioned management system are difficult to analyse, because there is no sufficient insight in the chemical waste "market".

As may be taken from the report SVA*) /1164, a number of private enterprises are operating more or less successfully especially in those fields where disposal or recycling activities are profitable from an economical point of view. A central installation for DND (detoxication, neutralization and dehydration) treatment is operational but with still poor commercial results.

In other, economically less attractive fields (for example the recycling of inorganic waste materials) activities are as yet slower to start. In some cases disposal industries have met difficulties in obtaining the necessary (environmental) licences. In another case (the enterprise with public entities as shareholders, mentioned above) serious financial problems have been encountered.

No facility for controlled landfill of chemical waste in accordance with the coming legislation has been realized.

At this moment no new management concepts on the national level are to be expected. Some studies are being carried out by the SVA, to advise the central government on the possibilities to create hazardous waste disposal facilities on a national level, but no indication can be given whether or which national chemical waste disposal facility can be expected.

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*) Stichting Verwijdering Afvalstoffen (Institute for waste disposal)

Initiatives should come from industry itself.
The fact that legislation on the subject will, in the near future, become effective, seems to have a positive impact on the attitude of industry toward the hazardous waste problem.

The management system under the CWA is at this moment still being discussed internally, so that it seems inopportune to make any detailed recommendations.

Very generally spoken, the following outline can be given; the quantity and hazardous character of chemical waste must be reduced as far as possible by industry itself by means of process modification, internal recycling, etc. For the remaining, inevitable waste, the management system should aim at realising maximal recycling and treatment facilities, operating with minimal environmental emissions. The system should assure that the waste is in fact treated in these facilities and not illegally dumped or littered.

It is hoped that the disposal of hazardous waste will be solved on a free market basis alone.

United Kingdom.

Waste disposal by public and private bodies is governed specifically by

- the Deposit of Poisonous Waste Act 1972, and regulations made under it
- Part I of the Control of Pollution Act 1974 and regulations made under it.

- the Dumping at Sea Act 1974.

In addition broad controls over planning, public health and the health and safety of employees apply to waste disposal as to many other activities.

Most waste disposal is undertaken by local authorities (for domestic waste) or private companies (for some domestic and commercial and most industrial waste). It is hoped that sufficient capacity is likely to be provided, particularly as it becomes more clear what disposal methods are acceptable under various circumstances.

One public corporation (the National Freight Corporation) has a minor involvement in waste disposal for third parties through its subsidiary companies.

Apart from the National Freight Corporation there are no disposal companies run by both private and public holders but a local authority may make its sites available to a private company and vice versa. Any disposal activities undertaken by statutory authorities should be provided at an economic fee, and not be aimed at undercutting reasonable charges by private industry.

Waste disposal authorities are the County Councils in England and the District Councils in Wales and Scotland. In principle the disposer has a free choice but in practice he will be constrained by the requirement that the site he uses should be licensed to receive that type or quantity of waste.

Collaboration between the public and private sector tends to be on an informal basis, though the Government has drawn on the advice of all parties in establishing the structure of waste disposal controls in the 1974 Act.

Local authorities have their own associations (the Association of County Councils, the Association of Metropolitan

Authorities and the Association of District Councils). Many waste disposal firms belong to the National Association of Waste Disposal Contractors and /or to the Road Haulage Association.

The organization of waste disposal in the UK is likely to change radically in the near future as the Control of Pollution Act is implemented. It will be necessary to assess the results of these changes before drawing any conclusions about what further improvements are needed to hazardous waste management in the UK. UK experience is that a mixture of public and private sector involvement in waste disposal is desirable. Organizationally it is expected that the framework provided for under the Control of Pollution Act proves sufficient.

USA

In the United States, new Federal legislation exists which directly regulates the transport, treatment, storage and disposal of hazardous wastes by public bodies (i.e., States, counties, municipalities) and private industry. The Resource Conservation and Recovery Act of 1976, which was enacted on October 21, 1976, provides for national standards for hazardous waste generators, transporters, and facilities for treatment, storage, and disposal. In addition, permits are required for such facilities. States may assume responsibility for implementation of the regulatory program. The Federal Government is to implement the program in those States which do not participate. Provisions of the new law become effective in October 1978.

Nuclear wastes and pesticide wastes are regulated under the Atomic Energy Act and the Federal Insecticide Fungicide Rodenticide Act (FIFRA), as amended, respectively.

Several other Federal statutes relate in an indirect way to waste disposal as a result of regulations to control air and water media.

Several of the States (i.e. California, Oregon, Minnesota, Washington, Maryland, Illinois) have comprehensive HW management legislation which authorizes them to write regulations controlling wastes throughout their "life-cycle" from generation through disposal. Others are preparing such regulations.

With few exceptions, hazardous waste transport, treatment, storage, and disposal is carried out by private enterprises which dispose of their own wastes or use other enterprises that are solely in the waste management business. The private sector (using private capital) operates the majority of the facilities which treat and dispose of wastes.

There are few publicly-owned land disposal sites for hazardous wastes (notably in California) and reportedly only one regional governmental authority (Gulf Coast Waste Disposal Authority, GCWDA) in the State of Texas which also accept wastes. This authority was created by the State legislature to control industrial and municipal water and solid waste pollution in the Texas counties around the city of Houston.

None of Federal or State programs require that sub-State jurisdictions (regional governments, counties, cities, etc.) must provide HW facilities. They generally prescribe permit-based systems where both public entities (e.g., counties) and private firms (e.g., treatment firms) may obtain permits by meeting certain performance requirements.

Obviously, in many States, due to no State or Federal hazardous waste management regulations, there is considerable under-utilization of treatment /disposal facilities, if any exist at all. The overall need for hazardous waste facilities is being investigated by the EPA. It is held that Federal legislation in this field when implemented under present conditions could bring about shortcomings in the facility sector. This could lead to either on-site generator treatment and disposal facilities or to the creation of public or quasi-public facilities.

The California State experience is the most detailed at this time in the field of hazardous waste management. This State already introduced the following measures:

a) Elaboration of Hazardous Wastes List.

b) Adoption of Hazardous Wastes Manifest on a form basis. Producers, waste haulers and site operators are required to complete the forms and to send copies to the Hazardous Wastes Department on a monthly basis. So, each manifest can be cross-referenced to see if specific waste materials actually arrived at approved disposal or processing sites.

c) Imposition of a fee on hazardous wastes, to be also collected by private hazardous wastes facilities (1 US-$ per ton).

d) Special regulations for extremely hazardous wastes implementing

  - the limitation of disposal to especially approved sites;
  - a duty to apply for special approval of the Department before such wastesare disposed of.

e) Minimum regulations on hazardous waste disposal including articles on

  - General Standards
  - Hazardous Wastes List
  - Extremely Hazardous Wastes List

- Wastes Mixtures
- Transportation
- Hazardous Wastes Facilities
- Extremely Hazardous Wastes
- Fees.

The basic California regulatory and enforcement system including transport manifests is easily transferable to other States and would only require similar legislation.

2. Regulations on Waste Stream Control and Practise of Control

Belgium

The production of industrial hazardous wastes is controlled within the framework of facility inspection.

With respect to collection and transportation, these wastes are subject to the regulations and control which are being prepared for the transportation of toxic products in general.

The disposal is controlled by the authority responsible according to R.G.P.T. (Règlement Général sur la Protection du Travail).

As to toxic wastes, these are controlled by the Ministry of Labour; other wastes which may be considered as hazardous - for example, wastes produced by slaughterhouses and hospitals - are controlled by the Ministry of Public Health.

For the implementation of the Act on Toxic Wastes, supplementary control instruments are stipulated with regard to production and disposal of toxic waste by the producer, to transfer and acquisition, storage, transportation, import and export, destruction and disposal (Art. 3 - 8).

Transfer, acquisition, storage, processing, neutralization or destruction of poisonous waste will be subject to notification and licensing procedures. The material and procedural details are regulated by the Royal decree of Febr. 9th 1976.

At present, the authorization of waste treatment facilities is not subject to any general conditions.

These conditions are set up individually for each authorization by the regional authorities on notification by the responsible ministry.

The Act on Toxic Wastes of 22 July 1974 provides that His Majesty stipulates the technical and financial conditions for establishing facilities for destruction, neutralization or disposal of toxic wastes, respectively the conditions under which the producer may or must carry out their destruction, neutralization or disposal. These provisions will also deal with collection, import, export and transportation of toxic wastes.

Denmark

The possible control measures are based on the legislation on hazardous waste and environmental protection as already mentioned.

The following control measures with regard to waste stream control should be pointed out:

1. Waste producing industry is obliged to report to the "Kommunal authorities" with sufficient details as to amount, composition and packaging of the particular waste (§ 5 sect. 1, § 6 sect. 2 CWR).
2. Waste producing industry has to deliver its waste at a place the "Kommunal authorities" have power to prescribe (§ 6 sect. 1 CWR). This obligation is subject to certain exemptions when industries can guarantee environmentally sound treatment either on premises or elsewhere.

3. Waste disposal sites and waste processing facilities are subject to prior licensing according to chapter 5 of the Environmental Protection Act. The municipal councils are in charge of issuing the permissions. Applications for license have to include the plans and other details necessary to decide on that particular project. Licensing of facilities can be subject to special terms or conditions. Licenses can be temporarly limited, altered or withdrawn in certain cases.

   Generally, there is no limitation to licensing to maintain the monopoly position of the "Kommunekemi". Still, it is not expected that very many licenses will be applied for, since Denmark has a comprehensive waste disposal system. There might be some licensing for industry-owned facilities in certain cases.

Apart from the above mentioned sectors of control, there is no special obligatory waybill procedure. After having received the report on particular wastes the "Kommunal authorities" issue "chemical waste-cards" which have to accompany the waste during transportation. These cards are not trip-tickets. They only include safety instructions and a description of the particular waste as to components, security measures, etc. Although there is no obligatory waybill procedure in Denmark a certain minimum waste-stream control is possible by two measures. The law provides the opportunity to inspect industry plants (§ 8 sect. 3 CWR). Before the regulations came into force, a survey on chemical waste was carried out by the Danish authorities. The information of this survey can be used to cross-check the actual figure of reported amounts of wastes with the expected figures.

Another means of control is the trip-ticket procedure provided by the monopoly disposal firm. The Kommunekemi does not accept waste unless a special declaration form (including

4 copies) is filed. One copy of that form is left with the producer, one is left with the receiving station the other 3 are sent to the Kommunekemi. These forms contain all information that might be necessary for a waste stream control. Although there is no statutory power to enforce the use of this form, its enforcement is a matter of fact. This means of control seems not to be extensively used by the authorities. Cross-checking might be difficult because there is no obligation to keep these declarations.

Transport is subject to general transport regulations. The problem of transport control is not taken very seriously in Denmark because long distance transportation, i.e., transportation from the receiving stations to the Kommunekemi plant is generally carried out by the Danish Railways. As already mentioned long distance transportation is included in the disposal fees thus keeping private haulers out of the business. The transport to the receiving stations is mainly cared for by the waste producers themselves using their own means of transportation, there is no important market for hazardous waste haulers in Denmark. This development was fostered by the fact that Kommunekemi accepts business with waste producers only.

The Danish policy tries to avoid too much control by providing environmentally sound disposal of hazardous waste at a reasonable fee to prevent improper handling.

Federal Republic of Germany

Surveillance and control of the waste streams are regulated in three administrative orders of the Waste Disposal Act:

- Administrative Order on Notification of Wastes
- Administrative Order on Collection and Transport of Wastes
- Administrative Order on Import of Wastes.

A Statutory Order as part of the new legislation on hazardous wastes became effective in June 1977. It includes a list of hazardous wastes thus imposing a nationwide uniform practise as far as control is concerned. Control measures like waste generation control and the notification system will be obligatory for wastes being described by this list. It is hoped that this measure will lead to a concentration of the existing control capacity on the mentioned waste streams and thus ensure an effective control.

The now existing regulations allow for thorough control of the wastes from their source to their disposal as follows:

a) Generation of wastes

Selected enterprises have to notify to the responsible authority type, condition and amount of the wastes generated at their plants as well as major variations or modifications in waste output. Producers of such wastes that cannot be disposed of jointly with residential wastes (i.e. especially producers of hazardous wastes) can be obliged by the responsible authority to report on type, amount and disposal of their waste. Furthermore they may be required to keep record books on wastes and to file reference documents. The authority may examine the books and documents. This procedure will be made automatically applicable for "special waste" under the above mentioned statutory order.

A system of accompanying documents (notification system) shall enable the responsible authority to trace the path of notifiable wastes from their source to ultimate disposal. Copies of the notification forms enter the files of the authority as certificates on the orderly transport and disposal of the wastes.

A Joint Federal and State Committee on Waste Disposal edited, in 1975, a Waste Catalogue wich is accepted nationwide and serves as a basis for the notification system, e.g. selection of notifiable wastes and application of uniform code numbers.

The Waste Disposal Act provides for extensive competences of the authorities for an effective surveillance. They may require from waste producers and from operators of disposal facilities information about operations, plants and all other objects which are subject to control. In their control function the autorities may enter premises and under certain conditions even residences. Waste disposal enterprises have, i.a., to give access to the disposal facilities for the purpose of control.

b) Collection and transport

The Waste Disposal Act demands that wastes may be collected or transported on a commercial basis or within commercial enterprises only under licence of the responsible authority. Only public waste disposal bodies are exempt. The licence must be granted in any case where it is ensured that impairment of the common weal is not expected. Uniform requirements for the licensing procedure are fixed in a regulation. In any particular case, the licence may be granted conditionally to ensure proper observation of compulsory measures.

The conditions for licensing of collection and transport are regulated by the Waste Disposal Act as well as by the related Waste Transportation Regulation. This regulation lists examples for documents which can be required for granting a license, such as

- driver's license;
- trade registration;
- license or permit under the Regulation on Transport of Hazardous Substances on Public Roads;

- documentation of sufficient liability insurance.

In practice the following additional documents are requested:

- proof of a sufficient vehicle park;
- proof of the technical suitability of the transportation facilities;
- analysis and notification of the wastes to be transported;
- declaration of a disposal facility that a waste in question will be accepted (this procedure will become compulsory as the new legislation will come into effect in Jan. 1977).

The licence can be granted for an individual case, for a limited or for an unlimited period of time. It may be restricted to collection or transport of specific types of waste.

c) Waste disposal facilities

According to the Act waste disposal is allowed in licensed facilities only. In principle, the construction and operation of stationary facilities depends on a defined, rather extensive licensing process including a public hearing and a court-like procedure. The licensing procedure specifies the technical conditions for the operation of the facility, e.g. with respect to air and water pollution abatement, etc.. Along with a description of the technical installations, the licence specifies the types of waste permitted for the facility. The observance of necessary safety measures is stipulated. Still, after granting of the licence, supplemental prescriptions for the waste disposal facility or its operation may be enacted.

The licensing procedure may be simplified for small facilities, for alterations of existing plants or when objections are not to be expected.

The actual state of the art can be analysed as follows:

a) Waste-stream control

after initial difficulties, the control system implemented in 1974 stood the test.

In the beginning the lack of a list of particularly hazardous wastes and of other wastes that need special attention was disadvantageous. In the meantime several Federal States have worked out lists of wastes especially adapted to the control functions of waste disposal authorities. These problems will be finally solved by the above mentioned new legislation enacted by 1 January 1977 and completed by statutory orders, now in preparation.

b) Transport

The licensing system for waste transports diminished the danger of illegal transportation of wastes. It is considered to link the permit system for transports and the notification system in order to simplify the work of the controlling authorities.

c) Licensing of waste disposal facilities

The licensing procedure for waste disposal facilities takes very much time. Site selection proves to be very difficult. These difficulties cannot be regarded as a result of the prescribed procedures, they show in other licensing procedures, too (problems of citizen's acceptance etc.).

France

The control of the different stages of hazardous waste disposal is exercised as follows:

- within the scope of a general supervision to which all enterprises are subject that produce or dispose of, professionally of hazardous wastes (Act of 19 December 1971). This act has been replaced by January 1st, 1977 by the Act No. 76-633 of 19 July 1976 on "Installations Classified for Environmental Protection".

These enterprises which employ certain treatment procedures or which install dumps as laid down in a general nomenclature have to obtain a prefectural licence accompanied with selected regulations that have to be observed in order to limit the hazards that may derive from their activities. Contraventions are subject to administrative or penal sanctions, including an order to correct the installations in question. The already mentioned new legislation will extend the scope of application to all installations or plants that could bring about hazards or inconveniences for public health or for the environment in general. It will apply for either private or public installations which will be classified and listed by statutory regulation. This list will include the producers of hazardous wastes but also other activities such as storage of wastes on premises, waste-treatment, resource recovery and disposal.

Installations will be classified according to the potential hazards of their activities. The most dangerous activities will be subject to prior licensing after public enquiry. The license which will be issued by prefectorial decree will include the conditions under which the activity might be carried out (this procedure will for example apply for metal finishing wastes).

Less dangerous activities are subject to the less rigid procedure of declaration. These facilities have to comply with certain conditions given in general prefectorial decrees.

Control of compliance with the terms of license is carried out by a special service of factory inspectors. Administrative penalties up to the closing of installations assure the enforcement of the mentioned regulations.

- By virtue of a special regulation ensuing from the Act of 15 July 1975:

  Enterprises which produce, transport or dispose of specific wastes listed by decree are obliged to give certain data to the authorities (art. 8).

At present two statutes are prepared to enforce this regulation by defining the procedure by which notice has to be given and by issuing a list of certain types of wastes for which this procedure will be applicable.

The mentioned statutes will apply for production, transport, import and disposal of the listed types of waste.

The declaration procedure is expected to be enforced soon. On the other hand, enterprises dealing with the disposal of specific wastes which are enumerated in the mentioned decrees have to obtain a licence by the authorities.

The decree relating to the above mentioned licenses according to the Act of 15 July 1975 has not yet been published. It is, however, foreseeable that among the conditions envisaged for obtaining the licence some of them may relate to the applied treatment procedures and others may oblige the applicant to conduct exhaustive collections in a given area.

Transport of hazardous wastes is subject to general regulations on transport of hazardous goods by railway, road and airways. These regulations include lists of hazardous substances to which they apply.

Furthermore the Act of 15 July 1975 and the decrees in preparation under it will oblige waste haulers to forward certain informations concerning origin, quantity and destination of certain wastes to government authorities. It is planned to introduce some additional formalities as keeping of registers, trip ticket procedures etc.

Netherlands

Art. 34 CWA provides an instrument to prevent the generation of certain types of particular hazardous waste. Up till now, however, there are no concrete cases for the application of this provision with respect to hazardous waste.

With regard to collection. Art. 21 CWA provides for a licence system for the collection of used oil. There are no control mechanisms regarding the collection as such of other hazardous waste. However the "regime" for used oil (art. 17 - 30 CWA) may be made applicable to other wastes by virtue of art. 32 CWA. In the case of treatment etc. of waste, originating from another party (i.e. disposal by "professional" disposal industry) a license under the CWA is required (art. 8 and 25 CWA).

Article 3 CWA prohibits to dispose of chemical waste by handing it over to all but a few qualified persons (holders of a licence under art. 8, holders of an excemption for deposition in or on the soil ex art. 35, persons who dispose of the waste abroad and persons authorized to dump wastes into the sea). The notification system (cf art. 4, 5, 6 CWA) plays an important part in controlling the disposal system.

The executive measures to be taken in pursuance of the CWA are still under discussion. They will include provision on the notification form.

There are no known voluntary control mechanisms, although industries tend to pay more attention to, and be more careful with hazardous waste, especially since the introduction of the CWA.

The enforcement of the act (as well as compliance with the provisions of the CWA in general) will be supervised by the Inspectorate Division of the Ministry of Public Health and Environmental Hygiene, but also by provincial and municipal authorities (cf art. 41 CWA).

Transport should take place in accordance with the provisions of the Hazardous Substances Act. In this Act extensive rules are given concerning transport, labelling, packaging, storage etc. of hazardous substances. But application of the general regulations to hazardous waste is effected by a provision stating that mixtures of hazardous waste must still be considered hazardous as long as the hazardous character is retained in this mixture. This makes it very difficult to maintain sufficient control.

The storage, treatment, processing etc. of hazardous waste is in all cases subject to the provisions of the other environmental acts (Public Nuisance Act, Air Pollution Act, and Pollution of Surface Water Act.).

United Kingdom

a) The generation of waste is not controlled, although certain long-stop powers are available to the Secretary of State under Section 100 of the Control of Pollution Act 1974.

b) The transport of hazardous waste is subject to legislation on the transport of dangerous substances in general; in addition the present voluntary system for labelling lorries carrying dangerous substances (the Tramcard and the hazard information panel) will probably become compulsory with time.

c) The collection of domestic waste is at present normally carried out by public bodies (local authorities) while that of hazardous industrial waste tends to be dealt with by private companies, either the waste producer himself or firms disposing of waste on a commercial basis.

d) The disposal of hazardous waste has until recently been governed by the Deposit of Poisonous Waste Act 1972. Under this it was a punishable offence to deposit waste on land in such a way as to cause an environmental hazard. Wastes for which notification is not required are listed in Statutory Instrument 1972 No. 1017 (Deposit of Poisonous Waste - Notification of Removal or Deposit - Regulations 1972). Removal and disposal of a wide range of wastes has to be notified to the local authorities and water authorities concerned.

This means generally speaking that notifiable waste must not be removed from premises or deposited elsewhere unless the appropriate authorities have been previously informed. There are some "season ticket" arrangement. Also operators of disposal sites must notify the authorities after a deposit has taken place.

The notice has to specify among other facts the nature and composition of the waste and its quantity, number, size and description of used containers and the name of the person which is to undertake the removal.
Standard forms have been prepared by central government but there is no statutory requirement governing their use. In practise comparable forms are used in most cases.

A copy of the notice shall be given to the person who undertakes the removal.

The same actions are required for operators of commercial tips.

The Deposit of Poisonous Waste Act was introduced mainly as an interim measure and will eventually be replaced by the Control of Pollution Act 1974 - Part 1 and the control mechanisms provided under it.

In June 1976 the site licensing system provided for in Part I of the Control Pollution Act was introduced. All waste disposal facilities on land (with certain very limited exceptions) now require a licence issued by the local authority. The licence will set out the conditions by which the facility may operate, for example:

- the duration of the licence
- the supervision by the holder of the licence of activities to which the licence relates
- the kinds and quantities of waste, the methods of dealing with it and the recording of information
- safety precautions
- compliance with the planning permission
- working hours of the plant
- the works to be carried out and other measures before the licensed activities are begun.

A licence can be subject to variation of conditions and revocation under specified circumstances.

Local authorities though not necessarily the same ones are also responsible for seeing that planning and public health requirements are met. The licensing provisions were brought into effect in June 1976. A year's grace is allowed to the then existing operators for obtaining a license.

No licences are yet required for collection and transport of hazardous waste though some such controls may be introduced in the future under Section 17 of the Control of Pollution Act.

The possible form of these particular control measures with regard to certain types of waste is still subject of considerations. As to Section 100 of the Control of Pollution Act it is not envisaged that the powers given under this regulation will be very widely used.

Disposal licences will normally not be granted where there are significant dangers of water pollution or risk to public health; when a licence is granted the conditions attached to it should ensure satisfactory operation of the facility with regard to protection of the environment and public health, safety and amenity. If the terms proposed by the local authority for any site licence do not meet with the agreement of the water authority the Secretary of State may settle the dispute. If planning permission is needed this must be obtained before a disposal licence is granted.

USA

State solid waste and /or water pollution agencies are generally operating the management systems controlling hazardous waste treatment, storage, and disposal.

Waste generation is not controlled under any state programme at present. Minnesota law does make provisions for generator permitting by counties. This concept has yet to be defined fully.

State Public Service /Utilities Commissions regulate the transport phase along with the Federal ICC (route and tariff setting) and the Federal Department of Transportation (labeling, packaging, and vehicle safety standards only) when interstate transport is involved.

Intrastate transport will presumably soon be covered by the Department of Transportation regulations.

In California, State designation of classes of landfills to accept certain kinds of wastes provides control over the land disposal portion of the system. Control over the flow of wastes from the generator is accomplished using the transport "manifest" which records information, travels with the waste from point of generation through ultimate disposal, and provides a record to the State government.

The experience of this State shows that control from "cradle-to-grave" seems feasible and potentially effective. Recently, additional enforcement resources had to be added to aid in the implementation of the control programme as initial waste flows to higher cost Class I landfills dropped off when generators /haulers did not observe active enforcement.

Ideally, data from manifests are available for:

(1) surveillance /enforcement
(2) waste survey and identification, and
(3) facility planning purposes.

California is developing computerized management information documents to assist in identifying, by exception, waste transporters and others who are not delivering wastes as indicated in the manifest.

A number of States require land disposal permits for all sites even though they may not control hazardous wastes from the "cradle-to-grave". These systems differ from State programmes in which the conditions, which the Director of the environmental agency may deem "appropriate", are the controls on land disposal.

Licences or permits for transport of industrial wastes are not generally differentiable from hazardous substance transport requirements. US Department of Transportation regulations affect labeling, placarding, packaging and shipping papers for substances judged to be hazardous from a transport safety point of view.

Carcinogens or low-level toxic material which bioconcentrate (whether substances or mixtures) and which are of environmental concern are not covered under the regulations because they are not a transport hazard.

The Federal Interstate Commerce Commission (ICC) grants authority to operate to an interstate carrier based upon a public need for the service and the carrier's fitness to perform the service. In addition, carriers who wish to transport hazardous materials must prove their safety fitness or ability to transport these goods with the minimum amount of risk to the public. These authorities apply to common carriers (i.e., transporters that offer services to the general public) and contract carriers (i.e., transporters under contract with one or a limited number of shippers). Those carriers which are unregulated include:

(1) carriers transporting agricultural commodities or seafood;

(2) private carriers which haul their own property in their own vehicles;

(3) intrastate carriers for-hire with origin and dstination within a single State; and

(4) local cartage carriers who transport property entirely within the commercial zone of a municipality.

The authority for hauling hazardous materials is reconsidered every five years or upon complaint by another hauler or affected party.

If a carrier is not providing a "reasonable, reliable service", his authority can be withdrawn.

A minimum level of insurance is required before an authority is granted; however, no additional coverage is required for hazardous materials haulers.

In addition to the Federal regulations on carriers, States have Public Service Commissions (PSC) or Public Utilities Commissions (PUC) which grant permits for the intrastate transport of hazardous materials.

No exceptional conditions on permit applications for hazardous materials hauling have been discovered, although this subject is still being investigated.

3. Planning, Limitation of Disposal Districts

Belgium

At present there are no regulations on waste disposal planning. No countrywide planning is executed.

Denmark

There is no intention to establish any hazardous waste planning in the sector of waste treatment /disposal facilities. No legal regulations ask for such a planning. Regarding the necessity of planning it has to be taken into account that with the existence of the central treatment facility in Nyborg, the Danish need for hazardous waste disposal plants is met.

There was some planning recently to find out the optimum distribution of receiving stations. 15 receiving stations are already operating, and 4 more are being planned. This brings the total figure up to 19, and means that receiving stations are within 50 km distance to any waste producing industry. There will be a standardization of receiving stations including standardization of equipment. It is planned to supply these stations with dehydration facilities to cut transportation expenses.

Federal Republic of Germany

The Waste Disposal Act requests that the Lander establish Waste Disposal Plans following super regional aspects. Particular consideration shall be given to special-wastes. In practice, this demand leads to the elaboration of separate plans for special-waste disposal. The plans indicate the form of management of disposal facilities and determine where and at which facilities special-wastes are to be disposed of. In addition, regional collection and treatment facilities are indicated.

For the time being, detailed plans already exist for the States of Baden-Wurttemberg, Bavaria and Hesse. Respective plans are being prepared in other Lander, too, all plans will be completed by 1979. The 1976 amendment of the waste disposal act includes a provision which obliges the Lander to establish provisional waste disposal plans for "special wastes". This provision aims at cutting short the long duration of the planning procedures in general and at providing better and up-to-date information for potential users of disposal facilities in particular.

The areas covered by disposal facilities that are operated by regional incorporate bodies on public law are fixed according to their regional competences. Compulsory use of a certain facility of this kind can only be imposed for the respective region. Also, the State-supported special-waste companies generally confine in their statutes the area of activities to the Land in question, whereas private disposal enterprises commonly operate nationwide. No cases are known, however, where disposal facilities, public or private, refused to accept special-wastes for disposal on grounds that the latter originated from outside of their area of responsibility. On the contrary, interstate cooperation works in an agreeable way.

Generally, the producer of waste is free to choose for himself a disposal facility, unless his enterprise or his waste happens to be subject to a statutory obligation to use a certain facility. At present, however, compulsory use is decreed only for few disposal facilities and regions. Free choice is, of course, limited by the capability of given facilities to handle certain types of waste. This ultimately leads to the point, where for certain types of hazardous waste there remains only one disposal facility or option in the entire Federal Republic of Germany.

Interstate cooperation in waste management is made possible by forming associations and by agreements between the individual State administrations. Clearing offices for information about disposal possibilities for hazardous wastes do not exist. Yet the competent authorities are required to give relevant information upon request.

France

The act of 15 July 1975 provides the possibility of setting up plans for the disposal of specific wastes. These plans should provide for optimum waste management for a given area. They will be issued by decree after public hearing and local consultations.

The scope of these plans may vary according to the wastes in question. The pertaining licences will be given in consideration of these plans in order to guarantee the most effective collection possible. In the near future, this planning procedure is expected to be enforced for waste-oil-disposal only.

At present, the waste producer is not obliged to treat his waste in a particular installation. However, as soon as the licensing procedure provided by the Act of 15 July 1975 will come into effect the producers of so-called special wastes will be obliged to use installations authorized to treat these specific wastes.

Netherlands

Since the CWA will be enforced by the central government itself, and because the Netherlands is a small country, no local or regional plans are foreseen. Only for the collection and disposal of used oil the country will be divided into regions.

There will be no formal national waste disposal plan, although the central government will, in their licensing policy, promote an even spreading of disposal facilities over the country by means of the license system. There are as yet only a few central treatment and disposal facilities. Industry is carrying out studies on possibilities for central storage facilities and for a special chemical waste landfill.

In principle, the producer or owner of waste has a free choice of facilities, provided he remains within the framework of the articles 3 and 17 CWA.

However, the freedom of the disposal industry to accept or exclude waste is limited in several ways.

Collection and disposal licenses for used oil will be valid in a certain area only, or for waste coming from a certain area only. (cf art. 23 § 1 and art. 27 § 1).

The holder of a disposal license for chemical waste may be obliged to accept certain specified wastes (art. 11 § 2 under b).

There is no collaboration of different organization systems.

United Kingdom

Section 2 of the Control of Pollution Act requires those local authorities with statutory responsibilities for waste disposal to draw up a plan for the disposal of waste arising in their area or being brought into it. The areas concerned will be counties in England and districts in Wales and Scotland. The size of these is regarded to be sufficient for planning purposes taking into consideration that the authorities are enjoined to take a wider view in consultation with at least their neighbour and often on a national basis. Section 2 of the Control of Pollution Act will require planning consultation under certain circumstances. It is not intended that central government will take a direct lead in this planning but the Secretary of State has certain appeal functions which may be of some relevance.

The legislation imposes a duty on the plan-making authority to consult widely with other authorities and bodies within its own area, and if appropriate outside of it; for example

- any water authority in the area of the disposal authority;
- the collection authorities of the concerned area;
- other disposal authorities which are or might be affected by the plan;

The plans for each area will then be made available to the Secretary of State.

The plans should include information on:

- the kinds and quantities of waste expected to be situated in the area;
- the kinds and quantities expected to be brought in the area;
- the kinds and quantities expected to be disposed of by the disposal authority itself;
- the kinds and quantities expected to be disposed of by "third parties";
- proposed methods of disposal and /or reclaiming;
- sites and equipment of waste disposal facilities;
- estimation of costs.

Some limitation of areas of coverage for waste disposal facilities may be desirable to avoid an excessively large volume of long distance transportation and to avoid accentuated local problems. The distribution of financial risks of the operators of facilities has not yet been taken into consideration.

USA

The new Resource Conservation and Recovery Act of 1976 in Subtitle D mandates that States, in cooperation with regional and local governments, develop comprehensive solid waste management plans, including hazardous waste plans. These planning provisions do not become effective until October 1977, however.

Current regulations do not generally require sub-State solid waste disposal plans.
The availability of Federal solid waste planning money and "comprehensive" planning funds from the Federal Department of Housing and Urban Development in the past has led some States and many regional and city planning entities to address the solid waste issue, usually residential and commercial wastes. Hazardous waste generation rates and treatment and disposal facility needs have generally not been addressed by these plans.

The one major exception is the newly revised Minnesota State statute. The Metropolitan Council, which is a combination planning and control agency for the seven-county area surrounding Minneapolis-St. Paul, is mandated to prepare a solid waste plan which addresses hazardous waste management, including facility siting and location. The Council is empowered to reject sites inconsistent with the plan.

Hazardous waste disposal planning is not regarded as means of government market segmentation. The idea of detailed Federal centralized planning to assure a profitable market for a disposal site operator is not compatible with the freemarket climate in which American industry operates - although it may be possible to consider such concepts at a State level. Experiences in Ohio indicate, however, that wastes go to other states for disposition. At present the main issue for Federal legislation is to assure environmentally sound storage, treatment, transport and disposal facilities. The economic decision of choice between different facilities will continue to rest with the generator.

Disposal districts or areas are not formally established. The free market and price determine the use of disposal facilities. In States where management control is lacking, the free choice of disposal facilities includes disposal in a municipal landfill, "midnight dumping", and other indiscriminate disposal.

The one exception to the described system is the Gulf Coast Waste Disposal Authority (GCWDA). The authority is a special regional-governmental entity which provides waste-water and hazardous waste treatment facilities to industries within its jurisdiction. GCWD is partially funded by the State of Texas. Its industrial waste operations are supported by fees collected from the industries that it services. GCWDA facilities are generally used by some of the larger chemical and petroleum refining companies in the area; several private hazardous waste disposal companies also exist in the same area as the GCWDA.

4. Waste Exchange Systems

The term 'waste exchange' is misleading because neither do waste exchange systems function in the traditional manner of 'exchanges' nor may the residues being sold this way be properly called 'wastes', since they are neither useless nor rendered for disposal. The activity of most waste exchanges is rather an information service about available residues from trade and industry. The idea behind this service is that substances or goods which crop up as wastes in one enterprise may be valuable stock for another enterprise. Waste exchanges thus support the business relations between trade and manufacturing enterprises in their own interest.

The negotiation for disposition of industrial refuse with respect to demand and supply generally works as follows:
the institution which operates the waste exchange system (in general, a manufacturers association) publishes in its newsletter lists of refuse which are available for exchange. The lists describe the material in question and state the amount available, once or continuously, while the supplier is indicated by a cipher. Under reference to the respective cipher, potential buyers address themselves to the waste exchange, which arranges the contact with the supplier.
The conditions of the bargain, however, are then negotiated directly between the two parties.

Some cooperation developed between waste exchanges of European countries. The German exchange systems collaborate with counterparts in the Netherlands, Austria and Switzerland. Also the Scandinavian countries, Denmark, Sweden, Norway and Finland, practise intimate collaboration in the Nordic Waste Exchange. Their experiences demonstrate that for small amounts of waste large distances are a principal limiting factor in international cooperation in this field.

Belgium

Waste exchange takes place at a voluntary level. The Federation of Chemical Industries has established a waste exchange.

Denmark

Denmark is member of the Nordisk Avfallbors (Nordic Waste Exchange). This project was initiated by the Danish, Norwegian, Swedish and Finnish Federations of Industry. Operation began in November 1973. The Swedish Water and Air Pollution Research Laboratory is working as a central secretariat.

This organization does not deal with material that has already an established market (as usual scrap, waste paper etc.) nor with "hopeless" wastes that would not find a market anyway.

The task of this waste exchange system is to provide a service as intermediary for informations on waste residues from industries where this waste is produced to industry where this waste can be used as raw material.

Additionally the Nordic Waste Exchange provides information about free capacities of waste treatment /disposal facilities for hazardous waste.

The offers are sent to the respective national Federations of Industry and after classification forwarded to the secretariat which publishes monthly lists that can be distributed in a suitable way.

The items are classified by

- offer or demand for residues or waste materials
- offer of current surplus chemicals or products
- available treatment capacities for hazardous waste.

Contacts are made with the secretariat which forwards the request to companies that have made an offer.

Federal Republic of Germany

Presently two waste exchange systems exist in the Federal Republic of Germany.

a) The VCI-Waste Exchange: This exchange is operated by the Verband der Chemischen Industrie (Association of the Chemical Industry). Supplies and requests as well as treatment capacities are published in the VCI newsletter. This exchange system is limited to a specific sector of industry inasmuch as the clients are characteristically enterprises of the chemical industry.

b) The DIHT - Waste Exchange: This exchange is accomodated by the Deutscher Industrie- und Handelstag (German Association of Chambers of Commerce). The chambers of commerce are, according to German law, bodies on public law with compulsory membership. Generally speaking all businessmen as well as companies and other incorporated entities on private or public law, the business of whose is established in the region covered by the local chamber of commerce, must be members therein. The DIHT-Waste Exchange publishes supplies and requests in a list which is arranged according to the separate districts of all the chambers which select the offers that appear to be appropriate for publication in their newsletters or other information services.

France

A waste exchange exists in France since April 1975 by the intermediary of the journal "Nuisances et Environnement" where offers and demands for all kinds of waste may be advertised every month.

In September 1975 the Union des Industries Chimiques (Association of Chemical Industries) decided to establish the utmost possible propagation of demands and offers. The relevant advertisements are centrally collected in the research institute IRCHA (Institut de Recherche de Chimie Appliquée) and at the same time published in the journal "Nuisances et Environnement" as well as in the technical periodical "Chimie Actualités".

Netherlands

The VNCI (Association of Dutch Chemical Industries) started a waste exchange in 1972.

During the first eighteen months of its existance, 70 lots (± 57,000 tons) were offered by 40 companies. From this quantity 6 lots (5500 tons) were sold. During 1975 - 1976 231 lots (± 30,000 tons) were offered by 93 companies, and 13 lots of certain types of chemical wastes were requested. An amount of 900 tons came from incidental wastes, e. g. laboratory clearance, basic material surplus, transport damage.

The success of the waste exchange has not yet been evaluated.The waste exchange can be promoted by a continuous supply and demand, especially by firms which regularly make use of the VNCI waste exchange.

In spring 1975 the German "Abfallbörse" in the Aachen area, has opened its doors to Dutch and Belgian industry in the border areas. In the first year of its existence a supply and demand of 84 lots has been notified. A limited number of these lots has been successfully mediated.

A certain amount of exchange of chemical waste will probably take place on a bilateral basis, apart from the exchange.

No quantities are known. It is felt that the waste exchange can be promoted by the notification system provided in the CWA and by contacts between the industries.

United Kingdom

The Department of Industry has set up a national Waste Materials Exchange which is run by the Warren Spring Laboratory at Stevenage. Also the West Midlands County Council organizes an "exchange" for local use.

The country-wide trial system of notifying wastes to the UK Waste Materials Exchange has produced some encouraging results. Still some degree of central entrepreneurial activity is thought to be advantageous. There is an indication of successful results of contacts made within at least one county waste disposal authority area; this approach may well develop to a limited extent as the waste disposal authorities will gain experience and knowledge.

USA

In October 1975, industries in the St. Louis metropolitan area through a regional chamber of commerce organization inaugurated a waste exchange service. This is the first formal U.S. effort in this direction. Recently, other waste exchanges have begun operation in Iowa and the Houston area in Texas. A private chemical waste brokerage company in the San Francisco area in California has been in operation for several years. In addition, a new Federal EPA report on the waste exchange concept, including the European experience, and some possible structures for implementation in the U.S. recommends trade associations as the best sponsors for such waste exchange clearinghouses.

5. Liability, Insurance, Financing

Belgium

Under the Act on Toxic Wastes, provisions will be made for financial and technical guarantees as well as for competent personnel. Liability insurance will also be imposed. The financial situation of the applicant i. e. insurance coverage and capital requirement on one hand and the technical methods to be used and the qualification of the staff on the other hand are examined by the admissionary committee and evaluated in its advice before the license is issued by the ministry.

As to financing the Belgian Law includes special regulations in art. 5, 6 Sect. 4 and 9 to 15 which still have to be made applicable by statutory regulations.

The creation of a "fond de garantie pour la destruction des déchets toxiques" (Guarantee Fund for the Disposal of Toxic Wastes) provided for by art 9 to 15, financed by issuing of bonds, governmental grants and by obligatory contributions of waste producers will be an interesting means for solving the problems of financing. The fund is not yet established. The statutory regulation for its creating is being prepared.

Denmark

There are no particular regulations on liability or insurance in Danish law on hazardous waste management. These areas are subject to general provisions of civil law. The CWR implemented some regulations on liability for damages arising out of accidents by handling chemical wastes (cf § 4 CWR). These regulations, however, do not include liability for third party damages, but just administrative liability.

There are no general principles of financing of hazardous waste facilities and administration measures to be reported, as the built up of a hazardous waste management is about to be completed in Denmark.

In the case of the Kommunekemi financing was solved as follows:

Kommunekemi is a non-profit-enterprise with a share capital of Dkr. 1,000,000 in form of a company limited by share. Shareholders are the association of Danish "Kommunes" representing 268 Danish "Kommunes", the cities of Copenhagen and Frederiksborg and, for reasons that lie in history of the establishment of that company, the Danish Tar Company, a Kommunal enterprise, too.

The costs of the Kommunekemi plant summed up to 70 Mill. Dkr. The major part of these investments was paid out of a loan given by the Danish Kommunes VAT - fund. This fund is built out of VAT-payments of the Danish Kommunes which are not VAT-exempt for their own VAT-bound activities. This fund has been established to provide low interest loans (i.e. 5 % below capital market interest) for public investments of the kommunes.

Kommunekemi until now has had severe losses due to the rather high investment costs.

Federal Republic of Germany

a) Liability and Insurance

Questions of liability for damages arising from collection, transport and disposal of waste are not specified by waste regulations. In principle, tort is the basis for liability. Violation of waste regulations is to be considered as a violation of a protective law which may, according to the civil law, result in liability for damages. Thus, the regulations of the civil code are applicable.

Special regulations apply to accidents during transport of waste. Generally, according to the relevant law, strict liability is provided, i.e. it is not necessary to prove the fault of the driver. The Waste Transportation Regulation provides that along with the application for a transport licence a sufficient liability insurance must be documented.

For the operation of a disposal facility, adequate insurance can be required in accordance to the Waste Disposal Act. Furthermore, the owner of a facility can be obliged to provide a board for land reclamation as well as for avoiding or eliminating any impairment of the public weal. A special regulation applies to public disposal facilities, i.e. facilities operated by public bodies, municipal co-operatives and similar organizations. They are generally insured against the risk arising at operation either in self-insurance or in municipal liability insurance associations. Private operators of facilities can be made to take out a liability insurance by special condition in the licensing order. In those cases, insurance is taken out at private insurance companies.

With regard to the term of limitation of damage claims, the general regulations of the civil code apply.

b) Financing

Facilities are generally financed at the credit market, irrespective of the type of enterprise. Public funds may be utilized to a certain degree. They generally serve for granting low-interest rate credits and facilitate the terms of payment. Under certain conditions the Lander (States) grant direct subsidies for construction of special-waste disposal facilities. The investment costs are/or should at least be covered by disposal charges.

France

Liability of the waste producers on one hand results from the stipulations or the general law; on the other hand, the Act of 15 July 1975 puts a specific responsibility on the producer of waste who is automatically liable for possible damages unless he engaged a licensed enterprise for disposal.

There exist no specific regulations with respect to insurance matters.

As to financing, it is planned to sponsor the construction of specific systems for the disposal of certain wastes by imposing taxes on the product causing the waste.

In the beginning stage, but generally only modestly, some waste disposal activities were sponsored by government aids (i. e. government subsidies up to 10 % of actual investment). The "agences de bassin", too, may intervene if the wastes to be treated are likely to pollute the water. In certain cases the "agences de bassin" paid up to 50 % of treatment costs for certain types of wastes disposed of by means of new disposal centres.

Netherlands

The CWA itself contains no provisions concerning either liability, insurance of financing, these being subject to private - as opposed to public - law. Only the costs of the inspectorate of the act will be financed by the levy system (art. 36 and 37).

In general, the producer or owner of hazardous waste will be liable for damages etc. caused by his waste. When the waste is handed over to a licensed disposer, liability will in principle be passed on. The license may, however, stipulate that liability remains with the producer.

This situation may vary from case to case. Another question is how long after disposal the disposer remains liable. Liability shall in most cases be based on tort (art. 1401 Civil Code); the statute of limitation thereof is 30 years.

Licences can be granted subject to regulations; it would therefore be possible to oblige the licensee to be adequately insured. There are no experiences to be reported on that subject matter.

The financial position of the applicant for a disposal or collection license is of relevance with respect to continuity of the waste disposal operation. Applicants must therefore present extensive data about their financial position.

As mentioned already, in the Netherlands, hazardous waste disposal is regarded as a normal industrial activity, for which responsibility is put primarily with industries. Therefore, only in special cases government aid in form of subsidies, guarantees etc. can be expected.

With regard to this general political attitude, as a rule, financing should be taken care of by the disposal industry itself. As a complete disposal spectrum is not available and the existing facilities have financial problems, both waste producers and the disposal industry have stated the need for financial aid from the government. Till now the Ministry has maintained a reserved position on this issue. Government support may be granted, but on an equal footing with other industry.

There are no special funds for industries based on the fact that their activities are favourable to the environment.

By exception to this rule the government may grant support for measures leading to a more effective disposal system

(research) and - on a strictly temporary basis - to promote the establishment of treatment facilities which are considered essential.

United Kingdom

Section 88 of the Control Pollution Act provides that civil liability for damage caused by the deposit of waste on land except in conformity with the licensing system rests with the offender.

There are no specific provisions regarding insurance and financing for waste disposal operations; general provisions in company and administrative law apply. There are no particular cases known where special extended insurance coverage was required on behalf of enterprises dealing with hazardous waste disposal.

In the UK, financing is mainly regarded as a private industry business although joint arrangements (i.e. cooperation between waste disposal authorities and private producers / disposers /recoverers of hazardous wastes) might be envisaged in the field of financing in particular for collection or recycling facilities.

USA

The new Resource Conservation and Recovery Act of 1976 does not directly address liability, insurance or financing aspects for hazardous waste management facilities. The Act does mandate new standards for financial responsibility and continuity of operation for treatment, storage, and disposal facilities. These provisions do not become effective until October, 1978, however.

No one State has addressed all of these topics. Liability and financial integrity (for purposes of site closure) are addressed by the Oregon regulations in which land is deeded to the State after the land disposal site is closed and a performance bond is available to support long-term monitoring and care.

This regulation only came recently into practise when a new site permit was issued. The total fund for this particular site will sum up to $ 75,000. Long term care and monitoring will be paid out of the interest on this cash-bond.

Many traditional solid and hazardous waste management facilities carry widely available liability coverage to protect against personal and property damage due to catastrophic occurences (explosions, fire, etc.).

In terms of insurance against longer term risks (e.g. groundwater contamination by a landfill) there is only one insurance company known that would cover such risks.

Financing of private facilities derives from private sources of capital i.e., there are no governmental subsidies. Public facilities are financed from tax revenues or government bonds.

6. Special Regulations or Management Systems for Special Types of Waste

Waste oil, hardening salts, solvents etc.

Belgium

Within the framework of the Act on Toxic Wastes regulations on hardening salts and solvents are being prepared. The regulation relating to waste oil is also under way and partly already carried out; so it is prohibited to reject or abandon waste oil.

Denmark

As mentioned already, waste oil disposal is subject to almost identical regulations as the disposal of other chemical wastes, waste oil regulations being the pattern for the new legislation on chemical waste.

The organizational framework for the "regime" implemented for used oil is very much the same as for chemical waste.

Used oil has to be delivered to the local collection services (receiving stations) unless the holders are exempt to do so for the reason that they have adequate facilities to dispose of the oil without causing hazards to the environment.

Federal Republic of Germany

Disposal of waste oil

Effective from December 1968 disposal of waste oil in the Federal Republic of Germany is regulated by the Waste Oil Act. Thus the Waste Disposal Act does not apply to waste oil as far as it can be collected in accordance to the Waste Oil Act. The Act and the pertinent regulations provide as follows:

a) Organization

Enterprises that hold a permit for disposal of waste oil are obliged to collect all spent motor oil accumulated in amounts of more than 200 liters in given districts which are fixed by a Federal Authority. For the waste oil producer the collection is free of charge provided that the content of contaminants in the oil does not exceed a certain value.

b) Financing

To finance the orderly disposal of waste oil a special fund has been created at the Federal Office for Trade and Industry. The fund is supported by a compensation tax on certain dutiable goods (lubricating oils, gas oils and greases). The tax is, at present, DM 9.00 per 100 kilograms of lubricating oil. The compensation tax is levied conveniently together with the mineral oil tax.

Disposal by regeneration or incineration but not by landfill is subsidized with this fund. According to the Act, the funded enterprises must pick up the waste oils where they crop up. Extraordinary expenses arising under special conditions can be compensated, too. The payment is fixed on the basis of a calculation comparing the expenses of other similar enterprises.

c) Supervision

Trade and other economic enterprises have to keep record books on each shop where a minimum of 500 kilograms of waste oil per annum accumulates. The same applies to companies which take over an equal amount of waste oil from someone else.

The Act furthermore regulates the obligation to inform the competent authorities and provides for the right of the authority to enter premises and residences and to examine certain records for the purpose of control.

With the sole exception of the Gesellschaft für Sondermüllbeseitigung in Bayern (Company for Special-Waste Disposal in Bavaria) waste oil is disposed of in accordance to the Waste Oil Act by private enterprises. Presently some twenty seven companies share responsibility to collect used oils in fixed areas from all over the country. In 1975 an estimated 305,000 tons of waste oil were treated with the assistance of the above mentioned waste oil fund.

A special problem is posed by the waste oil (mostly bilge oil) generated by inland navigation. This problem is being attacked by putting into service special collection ships.

The oils collected this way are sold to regeneration plants which draw support from the waste oil fund. For the River Rhine and its tributaries, an association on public law was established for the collection of oils from ships.

Without special legislative regulation the development of disposal of certain toxic wastes, e. g. used hardening salts, led to deep mine disposal as currently practised in the Federal Republic. Besides the measures generally stipulated by regulations, an analysis of each waste to be deposited into the mine is requested from the waste owner.

Without statutory obligation also networks of collection and reloading points are being established at present in order to mass larger amounts of special hazardous waste for long-distance hauling and to limit this way transportation costs.

France

Until now, specific regulations as to the envisaged wastes have not yet been published. However, they are likely to be subjected to the planned licensing procedure in the near future.

Netherlands

The CWA contains a special regime for used oil (cf articles 17 to 30 CWA). Art. 32 stipulates that this regime may be made to apply to categories of chemical waste. Yet this regulation has not been extended to other groups of hazardous wastes.

Art. 22 CWA states that a licence for collecting used oil may be refused in the interest of effective disposal of used oil. Art. 10 and 26 contain a similar provision with regard to licences for disposing of chemical waste respective to used oil. The explanatory memorandum states (p. 31) that the effectiveness of the disposal system is judged by the following three aspects:

- the disposal industry must function undisturbed and uninterrupted;
- the process must aim at the highest possible degree of neutralization, whereby the waste - or it's remains - are rendered as innocuous as possible;
- the disposal industry must be spread evenly over the country; taking into account the total offer of chemical waste, an optimal capacity must be aimed at.

For the transport of chemical waste or used oil no licence under the CWA is required, other transport regulations may apply.

United Kingdom

At present the specific wastes mentioned are subject only to the regulations applying generally to hazardous wastes although specific Codes of Practice have been published to deal with their disposal.

However, Section 17 of the Control of Pollution Act offers cope for controls over individual wastes and it is likely that more specialized controls will eventually be introduced. At the time being no detailed information can be given as to the further development in this field which is mainly dependent on the development of hazardous waste management in general.

Section 17 of the CPA enables the Secretary of State to make regulations

- for the giving of directions by disposal authorities with respect to matters connected with the disposal of special-waste;
- for securing that special-waste is kept in prescribed quantities and in prescribed circumstances only;

- for requiring the occupant of premises on which special-waste is situated to give notice of that fact and to give the prescribed informations;
- for the keeping of records by special-waste producers and disposers, for the inspection of such records and the providing of information;
- for offences;
- requiring that special-wastes of particular kinds should be disposed of by disposal authorities or by the Secretary of State only;
- for the supervision by disposal authorities;
- for the recovery of expenses by disposal authorities.

There are no special management forms for the disposal of special-wastes to be reported although the recommended forms are normally used for all notifications under the Deposit of Poisonous Waste Act.

USA

Specific categories of industrial hazardous wastes are generally not addressed in disposal regulations. However, a special provision of the new Toxic Substances Control Act mandates that the Federal EPA issue regulations for the disposal of polychlorinated biphenyls (PCB's). These regulations are scheduled to be promulgated in July, 1977.

There are no special organization systems for single groups of hazardous wastes.

III. Evaluation of Results

Introduction

The basic material available for an evaluation of the existing organizational systems for disposal of hazardous wastes for the purposes of this report were the replies to the questionnaire circulated by the pilot country, the attachments enclosed by some countries, and information provided after the plenary meeting in May 1976.

When the questionnaire was prepared, it was assumed that in the replies to the questions under 2 and 3 different models for disposal organization would be described and that problems and recommendations from national practice, from the realization of such organizational models and from control of hazardous wastes would be submitted. This was the case only to a very limited extent. The reason for this is that the majority of the participating countries is only now creating organizational forms for the disposal of hazardous wastes and that, consequently, some countries do not yet have final concepts and models for organization. This made it practically impossible for some of the countries concerned to make recommendations with regard to the questions asked.

The evaluation of organizational decisions and forms and applicable laws in this report therefore only takes into account the experiences described by some countries or studies and considerations made available to the pilot country.

The project "Organization" comprises a very complex subject. Apart from the difficulty of separating it from other sub projects dealt with in connection with the NATO /CCMS pilot study on "Hazardous Wastes", it must be taken into consideration in evaluating organizational forms, means and methods that this report is addressed to a large number of countries of greatly varying sizes and different constitutions (federal states, decentralized and centralized states). The problems examined differ according to the type, structure and legal system of the various states.

The dependence of organizational decision on a large number of basic and secondary conditions which in some cases show great differences from country to country could not be taken into consideration in this summary assessment.

It should be pointed out that decisions on organizational measures are strongly influenced by environmental, economic and legal conditions. Considerations of this kind had to be largely disregarded in this report.

1. Basic Conditions of Organizational Measures

Organizational questions of hazardous waste disposal should not be regarded in an isolated manner, but must be viewed in connection with other waste management aspects:

1. An important aim of waste management is to reduce or even to avoid the generation of wastes by applying appropriate production processes or raw materials.
2. Another important goal is the recycling and re-use of wastes. In this connection, the waste exchanges can carry out important tasks.
3. Finally, the need arises to dispose of unavoidable wastes, causing minimum or no harm to the environment taking all relevant factors into consideration. In principle, this need should only arise if it is impossible to avoid or to re-use wastes. Priority should be given to a disposal method by means of which an economic benefit is achieved without endangering the general public.

The provisions made by the member states are only to a small extent aimed at avoiding wastes in production. As far as can be determined, only the Netherland's law on chemical wastes and the UK Control of Pollution Act contain provisions which permit interventions in production processes in order to prevent the generation of certain wastes. Other countries like the U.S. are approaching this problem in a wider context of environmental hazardous or toxic substances legislation.

There are various reasons for the reluctance of the member states to intervene concretely in this sector for regulatory purposes:

Any regulation concerning production procedures constitutes an encroachment upon the freedom of enterprise and of product design which are regarded as central elements of the economic system of the member states. It is often overlooked that regulations concerning production procedures do exist in cases where they are considered to be necessary to ward off dangers to the public. Such interventions require detailed knowledge of the production processes and of existing possibilities of making use of "non-waste" technologies. The people responsible for issuing such regulations do not - or not sufficiently - possess this knowledge, and they can only obtain it with difficulty for reasons connected with production trade secrets. In the UK the Alkali Inspectorate does discuss alternative production processes with respect to alleviation of discharges to atmosphere.

This has to be said although some laws do enable some information to be obtained. It seems to be very difficult to enact and practise regulations in this field because of a definite reluctance of industries to provide relevant information .

Furthermore, it is often claimed that industry itself is keenly interested in waste reduction technologies. This is normally only true if the profitability (taking the cost of waste disposal into consideration) of the relevant processes is ensured. It is possible to influence the production process via the costs of an orderly waste disposal system by means of the market mechanism without having to resort to prohibitions or legal interventions in production. Where it is obligatory to have wastes treated in expensive disposal facilities with stringent standards or to operate such facilities, waste reduction technologies will probably be increasingly used because of the cost of disposing of the waste in these facilities.

It has to be noted, however, that the costs for waste disposal for industrial residues will be passed on to the final consumers of goods as part of the costs of production as long as the market situation allows industry to do so. Still these increasing costs should be a strong incentive towards cutting costs of production by reducing the expenses for waste disposal by the above described methods, thus trying to achieve a better position in market competition.

This desirable development towards waste reduction technologies and internal recycling could be promoted by uniform standards for waste disposal /treatment facilities and a fee policy that does not allow the operators of facilities to remain under a certain fee level.

With regard to uniform fee levels it has to be noted, however, that it will be very difficult, indeed, to achieve uniform fees in a competitive open market because some facilities (e.g. landfills) will benefit from particularly favourable conditions. Also, natural circumstances differ amongst and also within countries, and thus the cheapest acceptable disposal procedures are not always at uniform cost. Taking into consideration this problem it seems clear that adequate standards alone will not suffice as means to achieve a uniform fee level.

Adequate standards for waste disposal facilities are presently aimed at by means of licensing policy only. None of the participating countries communicated legally binding uniform standards to the pilot country; however, some countries are developing such standards now.

The restriction or prohibition of specific production processes should only be considered as a last resort. An assessment of this possibility requires practical experience which is at present not sufficiently available.

The recovery of raw materials is also an effective means of reducing the generation of waste. Also in this case, economic considerations play an important role.

The recycling of industrial residues depends, inter alia, on their composition. Recycling is the easier and cheaper the less the residue is contaminated. In this case, the state can help by means of regulations which require the separate collection of residues where appropriate. As far as is known such regulations do not exist in any country so far, although some existing laws do enable such regulations to be issued. If waste recycling or separate collection is not regulated, but rather is governed solely by economic factors, it is likely that only a small portion of total wastes generated will be exchanged or recycled. However, as waste treatment and disposal are more stingently, the associated costs will probably rise. This will tend to make waste recycling and exchange more attractive economically.

Costs of Transportation

As already mentioned costs for disposal cannot be disregarded as a basic factor for all organizational measures in the field of hazardous waste management. Particularly the transport costs constitute an important portion of the disposal costs. These costs which have to be born by the waste generator can be influenced by organizational measures.

The transport costs decrease per unit of quantity if the total quantity to be transported increases. The quantities of hazardous wastes are often so small that the transport from the generator to the disposer cannot be carried out at optimum costs. From this point of view, the establishment of collection centres recommends itself. The wastes from various producers can be collected and kept ready for onward transportation at these collection centres. Problems may arise with regard to the provision of adequate interim storage facilities for different wastes.

For certain enterprises, the distance to the nearest disposal facility may be a disadvantage since their competitiveness may be affected by the transport costs. The enterprise itself has no influence on the location of disposal facilities unless it has one of its own. These site disadvantages can be compensated by the establishment of collection centres if the waste generator is charged with transport costs only for the delivery to the collection centres. The cost of the transport from the collection centre to the disposal facility could then be added to the disposal costs. This procedure is practised in the Federal Republic of Germany by the "Company for the Disposal of Special Wastes" in Bavaria and by the Danish Kommunekemi. The idea of using collection centres to compensate for site disadvantages, however, is strongly linked to and thus limited by the general policy of hazardous waste management as a whole and by the different national approaches towards large and specialized disposal facilities in particular.

Definition and Classification of Hazardous Wastes

The definition and classification of hazardous wastes is of decisive importance for organizing their disposal. At the time being there is no uniform international application of a term like 'hazardous' waste. In the relevant laws the term is generally not used. Existing laws define the following terms:

- 'Hazardous Waste' (US, California, Minnesota, etc. UK**)
- 'Chemical Waste' (Netherlands, Denmark)
- 'Special Waste'*) (Germany, UK, France)
- 'Toxic Waste' (Belgium)

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*) using this particular term or giving special regulations for certain types of waste listed by statute.

**) according to the Deposit of Poisonous Waste Act of 1972, latter to be fully replaced by the Control of Pollution Act.

In general these acts enable issuing of regulations including a definition of relevant wastes by a listing or a catalogue. Elaboration of such lists for the purpose of legislative regulations is envisaged or in progress in all participating countries. Annex 1 includes a list of relevant acts, bills or regulations communicated to the pilot country.

The lack of sufficiently precise definitions constitutes a difficult problem for the introduction of legislation as well as for the construction and equipment of facilities. It cannot be precluded that the slow development of organizational systems for the disposal of hazardous wastes is to some extent due to the uncertainty of the definition.

The definition has a special influence on the following areas:

a) Planning

For planning purposes, a classification of hazardous wastes is required for the following matters of detail:

- Determination of the quantities of the various types of waste
- Determination of the possible disposal method for the various types of waste
- Overall planning (number, locations and distribution of the facilities)
- Need for collection sites
- Special regulations for certain types of waste.

b) Control

Of special importance is a sufficiently precise classification of the wastes for control purposes. It permits, on the one hand, a concretization of the control measures with regard to special-wastes (e.g. preparation of analyses, legal provisions concerning disposal or treatment, utilization of certain wastes) and, on the other hand, a clear definition also permits a restriction of control to selected problematic wastes. As long as hazardous wastes are not defined in a precise and practicable form, an effective control system must extend to a large variety of unproblematic wastes as well. The reliability of the control system decreases with a growing number of wastes requiring control.

c) Transportation

Safety measures during transportation, too, require a precise classification of the wastes. Since the wastes are normally not chemically pure, it is difficult to subject them to the current regulations concerning the transportation of hazardous substances.

It is felt however that the problem of safe transport of hazardous waste should be looked at generalizing, i. e. considering the transport of hazardous chemicals in general instead of elaborating a special safety system for the transport of wastes because potential dangers are very much the same. Transportation safety questions are dealt with in the report on the Transport subproject.

d) Financing

The definition finally also affects the problem of financing if special financing methods are to be introduced for certain wastes.

It is very strongly felt that no means are to be seen to elaborate a single definition which could cover all these aspects. Existing definitions usually aim to cover one or two of the mentioned problem areas only.

2. Form of Management of Facilities for Disposal of Hazardous Wastes

Legal Status

None of the countries at present require a specific form of legal organization (e.g., corporation, partnership, limited partnership) for operators of facilities for the treatment or disposal of hazardous wastes. All forms of organization, private and public, available under the various legal systems are permitted.

The choice of the legal status may affect public interests since it often has an influence on the liability and capital of the operator.

These questions normally do not require any new legislation because they can be solved by imposing conditions for the granting of licences for facilities. Such conditions may consist in the provision of guarantees for certain risks or in the obligation to take out certain insurance.

Operators (Public Corporation /Private Company)

While the legal status determines how the facility is operated, interms of liability etc.,the choice of the operator determines who operates it. Public corporations may (with certain exceptions) have the legal status of a private operator.

The question whether public corporations act as operators of disposal facilities is of fundamental importance.

By acting in this way, government authorities can exert direct influence on the disposal of hazardous wastes. This influence can be further increased by simultaneous legislation which makes the utilization of these facilities obligatory.

Such a development appears attractive at the first glance because it would permit the formation of a uniform and comprehensive organization for the disposal of hazardous wastes. Apart from this advantage, however, the disposal of hazardous wastes by public corporations or by private organizations sponsored by them may also have disadvantages if it is made a principle. The reservations made by various countries against such an organization can be seen from a comparison of the advantages and problems:

a) Advantages

- The creation of an organization for the disposal of hazardous wastes with the participation of public corporations can, although not automatically, make it possible to ensure directly the adequate utilization of the facilities, and direct influence can be exerted on the observation of certain disposal standards.
- The government is obliged to ensure the orderly disposal of hazardous wastes (elimination of dangers to the general public). This obligation would be met if the responsibility for disposal would be taken over by public corporations.
- The creation of a comprehensive system of private disposal enterprises is generally not possible by law. The influence of government authorities is often restricted to the licensing of facilities. This allows only restricted control to be exercised. Special legislation on organizational forms (e.g. compulsory mergers of waste-generating enterprises, the enforcement and financing of non-governmental disposal organizations) would raise complex legal questions and would be politically difficult to realize. These difficulties are avoided if disposal is a matter for essentially government-supported enterprises.

b) Problems

- The decision to entrust the disposal of hazardous wastes to public corporations would result in a reduction of private investments. The readiness to establish private disposal enterprises is bound to decline.
- The separation of waste disposal and waste generation may give rise to problems of coordination and cooperation. As a rule, private disposal enterprises and disposal facilities of the waste generating industries are more flexible in adjusting to changing situations than government enterprises. In the case of industry-owned facilities, adjustment of waste disposal to the production processes and the technical know-how of the operators are additional advantages.
- The operation of disposal facilities by public corporations may lead to political priority conflicts. The pursuit of priorities in environmental policy such as waste reduction and waste utilization may be affected (problem: sufficient utilization of the existing facilities).
- The willingness of waste-generating industries to develop and utilize waste reduction technologies may be deminished if all responsibilities were taken over by public corporations.
- The establishment and operation of facilities for the disposal of hazardous wastes by public corporations may be a considerable burden on government budgets. This would apply especially if such facilities had to compete with more cheaply run installations of private operators (e. g. processing or treatment facilities with landfill sites).

The disposal of hazardous wastes by public corporations may therefore raise a number of problems. On the other hand, it has to be noted that all countries introducing an organization of hazardous waste disposal with a strong influence of public bodies first try or tried to achieve a supply of facilities run by private enterprise. The proposals for the disposal of hazardous wastes with the participation of public corporations made in some of the participating countries are rather a result of serious deficiencies which appeared in connection with disposal by private enterprises or which are consequence of the lack of facilities or capacities for the disposal of such wastes.

As a rule, private activities in this field develop only if a profit can be expected. Because of the high investments for facilities of this kind, it is hard to say whether a comprehensive system of facilities for the treatment, utilization and disposal of hazardous wastes will develop as a purely private enterprise on private initiative and by private investments alone.

The question of ownership of disposal facilities should for all these reasons not be decided in the sense of an "ideological" commitment to a certain system, but should be pragmatically subordinated to the objective of the comprehensive provision of well equipped facilities.

This objective may require that public corporations operate facilities for the disposal of hazardous wastes if

- the orderly disposal of hazardous wastes in a way which meets the requirements of environmental protection is generally not possible because facilities are either not available or not available in sufficient numbers,
- private facilities which are required for the orderly disposal of specific wastes do not exist or are not sufficient.

However, before the take-over of the responsibility for waste disposal by public corporations, an attempt should be made by means of contractual, administrative or other stimulating measures and, if necessary, also by legislation to give the producers of hazardous wastes a share in the organization of facilities.

Such participation is also congruent with the principle that the polluter should pay.

Organizational forms which aim at the participation or merger of private enterprises for the disposal of hazardous wastes have so far only been developed to a small extent. The waste oil disposal system in the Federal Republic of Germany may be cited as an example of such an organizational form: Private enterprises can receive subsidies from a fund as an incentive to undertake the disposal of waste oil. By this method, the development of the disposal prices is controlled by the government. This example can, however, not be transferred at will to any other area since in this case the conditions are especially favourable due to the possibility of levying the duty jointly with the mineral oil tax.

The experience gathered by the various member states will be of special interest for the future development of organization for the disposal of hazardous wastes. Especially in Belgium and in the Netherlands interesting new possibilities seem to be developing.

In its Act on Toxic Wastes, Belgium provided for the creation of a guarantee fund for the disposal of toxic wastes. The Netherlands, too, provide in their law on chemical waste for the levying of taxes to meet the cost entailed in implementing the act. It has to be noted however, that apart from the legal provisions no further steps have yet been taken towards a realization in practice.

Still the experience of these countries may be of importance for the further development of organizational forms for disposal of hazardous wastes. There is on the other hand the

Danish example of a comprehensive waste disposal system, sponsored by the government and carried out by regional authorities.

The following measures have an important influence on the development of organizational forms:

a) Planning

Central and local government will have to carry out the conceptional work for a waste disposal system if it wants to avoid that the provision of disposal facilities and their distribution are more or less random.

b) Clarity of decision

The submission of a plan alone will normally not be sufficient. In addition to the plan, a description of the organizational concept may be useful. The government authorities dealing with questions of the disposal of hazardous wastes should therefore submit a clear organizational concept as early as possible.

In the Federal Republic of Germany, it is noticeable that in those Lander where the establishment of special waste companies with government participation is being discussed or intended, private initiatives for the construction of disposal facilities are strongly declining because of the uncertainty of the market.
The same is true for Denmark.

c) Finacial aids

The offer of financial aids for the construction of disposal facilities may be an incentive to private investment activities. Especially technologically developed and accordingly cost - intensive treatment and disposal facilities can hardly be financed without low interest loans and accompanying operational guarantees (e. g. by fixing areas to be served by the facilities).

Summary

Hazardous wastes should primarily be disposed of by the producers of these wastes or by private disposal enterprises. In this case the responsibility of the government is limited to the planning, control and execution of supporting measures.

If the satisfactory disposal of hazardous wastes cannot be ensured by private disposal enterprises, additional governmental measures are necessary. In principle, there seem to be only two possibilities:

- legislation concerning the financing and ownership (compulsory contributions and compulsory organization)
- the establishment and operation of disposal facilities for hazardous wastes by public corporations or with the partnership of public corporations.

3. Control

There are various possibilities of controlling the generation and transfer of hazardous wastes. Controls by introducing obligatory notification and waybill procedures seem to become the general practice. This can extend to the waste generation in the production plants, to transportation (or any transfer of wastes by the producers) and finally to the treatment and disposal facilities, or it can be limited to one of these areas.

Again it has to be emphasized that control systems cannot be looked at separately. Necessity, form and intensity of control measures are directly linked with the general management principle in the country concerned.

Moreover control measures introduced at one stage of waste stream control do influence the control measures to be taken at the consecutive stages.

As a general rule, control measures should be more formal when hazardous waste management is left to private enterprises for all stages of waste disposal.This does not necessarily mean that control could be totally neglected when disposal is carried out as a whole or in part by public bodies, but certain distinctions have to be made according to the governing management scheme.

The control of the generation of hazardous wastes at source, i.e. in the production plants, seems to be the most important one of the possible methods. It offers the decisive advantage that it can start from the total quantities of wastes in the production plants and pursue their further utilization or disposal. In spite of its convincing advantages, this method is not generally employed. Yet possibilities of a more integrated system of control are investigated in some of the participating countries.

The transfer of hazardous wastes, however, is controlled in most contries. The legal regulations generally require that the appropriate authority is notified. Controlling transfers alone would, however, be incomplete. All processes by which hazardous wastes leave the production plants should be controlled. Especially control of transports of wastes carried out by the waste owner himself seems to be necessary.

The restriction of control to disposal facilities does not seem to be an appropriate means of controlling the transfer of hazardous wastes. In this case, only those hazardous wastes are controlled which in any case go to a treatment or disposal facility. It is, however, these wastes which need control least of all since their orderly disposal is most probably ensured.

The control of disposal facilities is primarily necessary for public health and safety reasons and in order to verify the observance of operational conditions.

Control is usually exercised by means of a legal requirement for the notification of certain processes involving hazardous wastes.

Some countries (Federal Republic of Germany, the U.S.) already introduced waybill procedures, others (Denmark, the U.K.) use the form of notification to the supervising authority as means of control. A third group of countries (France, Belgium, the Netherlands) are considering appropriate control measures.

A notification for the purpose of control only fulfils its purpose if it includes sufficiently precise information on the type, quantity and composition of the wastes and if by means of this information the proper transport and disposal of the wastes can be determined and verified. This can be achieved if copies of the notifications accompany the wastes and if one of these copies with information on transport and disposal (or other utilization of the wastes) is sent to the controlling authority. Only the collection of notifications concerning the generation, transportation and disposal of the wastes makes complete control possible. Control of the various disposal stages can be ensured if copies of the notifications remain with the transportation firm as well as with the treatment or disposal facility. The somewhat complicated nature of this procedure is justified by its reliability.

It has to be noted that the information required for control of disposal has to be more detailed than the information necessary to supervise the transport of wastes. The disposal has to take into consideration a much wider range of environmental aspects, including the handling of wastes. A comprehensive method of control has to pay due regard to this fact.

In the preparation of the waybills (notifications) it should be taken into consideration that their evaluation could provide important information for the planning of waste disposal.

The collection of waybills and thus the control over the disposal of wastes can be facilitated by the utilization of electronic data processing. Experience from the Federal Republic of Germany shows that the evaluation of waybills by this method is feasible and gives good results.

As to control of transportation there are various possibilities for controlling transport enterprises from the point of view of safety and reliability. It may be required by law that the transport enterprises draw a licence for the transport of hazardous wastes (licensed enterprises). While it is being examined whether a licence should be issued to a firm its reliability, proficiency, financial situation and technical equipment can be verified. According to the result of this verification, the licence may extend to the transport of wastes in general or be limited to the transport of certain wastes.

This procedure has a decisive advantage. It places high demands on the quality of the transport enterprise and may thus, in certain circumstances, make the control of each individual shipment superfluous. This way, the administrative procedure can be simplified and the workload of the authorities can be reduced. If this procedure is applied consistently, the market will soon be in the hands of a limited number of well equipped transport enterprises. The risk of loosing their licence in case of neglect or the non-observance of conditions, will compel the transport enterprises to be careful. A similar licensing procedure exists in the Federal Republic of Germany for all long-distance road haulage enterprises.

The transport of wastes may also be authorized by a licence for an individual case. This would mean that anybody could work in this trade. The number of potential haulage firms becomes much larger so that it is more difficult to control the enterprises. However, in this case as well, the number of transport licences or the number of transport enterprises can be restricted by placing high demands on equipment and vehicles.

4. Planning

The collection and evaluation of existing data as to the distribution of waste generation and on the total amount of wastes to be disposed of should be the first step towards the planning of a waste dispdsal strategy. This planning should be undertaken in close cooperation of government and local authorities, the waste producing industry should be heard.

Planning has to take into account the existing legal basis. The form and contents of the planning measures will vary according to the peculiarities of the legal system of the country concerned.

As a rule it can be said that planning has to be given a higher priority in large countries, particularly in federations than in small centralized countries.

It is certainly preferable to elaborate a complete planning concept, but planning decisions can also be made during the process of licensing of facilities. This means of course that adequate statutory powers should be given to the decision making authorities in this case in order to avoid ultra vires decisions.

In all countries a licence is needed or contemplated for waste disposal facilities. A decisive aspect in licensing a facility is its suitability which must be judged within the context of an overall concept of hazardous waste disposal.

The selection of the site is of special importance within the planning process. The transport costs are an important element of the disposal costs and, therefore, have to be taken into consideration in the selection of the site.

Experience shows that the disposal of hazardous wastes to ensure environmental protection should be carried out on a large scale. Planning should therefore be carried out on the same scale. It can thus be ensured that the facilities are supplied with sufficient quantities of waste and that the areas which they serve are large enough to justify investments for expensive equipment.

Under the aspect of the minimization of transport costs, the establishment of collection points (with or without pretreatment facilities) according to the local conditions is of special importance. The establishment of such collection points and their equipment should form part of the plans. But due regard should be paid to risks of mixing antagonistic wastes.

Planning should be based on an analysis of requirements. This analysis should take into consideration the existing number of disposal facilities.

The requirements are determined by the quantities and types of waste and their places of origin. In the requirements analysis of the future trends should be considered according to available information. Experience shows that an assessment of the composition, the quantity and the distribution of wastes is difficult. The difficulties in determination of the planning assumptions result from the uncertainty of future economic and technological developments.

Apart from budgetary considerations, this uncertainty seems to be another important reason for the reluctance of the majority of countries to organize the disposal of hazardous wastes under governmental responsibility. The only way to reduce this uncertainty is close liaison of the groups responsible for planning with the waste producers and the operators of existing waste disposal facilities.

Under the assumption that the quantities and composition of wastes produced are not constant, a continuous feedback between planning, practical experience and legislation is necessary. This aspect should already be borne in mind in laying down the responsibilities of the authorities and their procedures.

5. Waste Exchange Systems

Waste exchanges are generally regarded as desirable organizational institutions which contribute to the reduction of waste disposal. Since, as a rule, they constitute a free service of the organizer, the untilization of this organization does not inflict any costs on the supplier and customer.

Waste exchanges at present confine their activities to the publication of offers and demands thus following rather the "waste clearinghouse" system thant the "materials exchange" concept. A sufficient degree of publicity is achieved by publications in the information sheets of associations.

Waste exchanges may, by their mere existence, give rise to and support desirable developments towards the increased utilization of industrial residues.

The limits of the waste exchanges as conceived at present are defined by the functions that they have to fulfil. They act only as intermediaries. Thus, playing a strictly passive role they cannot influence the creation of a market for industrial residues, their function being essentially static. Nevertheless, waste exchanges are an important element in the waste management system which comprises all stages from waste reduction via waste utilization to waste disposal.

The existence of waste exchanges proves that without them the possibilities of marketing the residues would not be fully exhausted by the inherent market mechanisms. The following marginal conditions determine the success of waste exchanges:

- supply an demand
- quality of the residues (purity)
- transportation distances
- disposal and raw material prices.

This can be put in the formula that effectiveness of waste exchange is best if high disposal costs coincide with high raw material prices whereas treatment costs for reuse and costs of transportation are low.

The information and experience available with regard to the utilization of residues and the conditions to be observed are comparatively new and still inadequate. As a result of questionnaires circulated by the waste exchanges, the following difficulties appear to exist:

The sale of industrial residues often proves impossible because of inadequate quality (purity). For future work of waste exchanges it could be helpful to carry out studies in order to determine the technical requirements for the quality of residues and to find out whether the usability of residues can be enhanced by changing the processes involved. Such studies could also be basic for selective governmental measures to increase the utilization of certain residues. As most industries are very much concerned to keep informations on waste streams secret, anonymity of offers and confidence in the operators of waste exchanges seem to be essential. Any direct government involvement in the organization and operation of waste exchanges must take appropriate regard of confidentiality aspects.

A possible measure to improve the effectiveness of waste exchanges could be to make the separate collection of nonpolluted residues compulsory. Operators of waste exchanges point out that this measure could considerably improve the work of the waste exchanges.

Uncertainty of supply seems to be an important obstacle to successful operation of waste exchanges. Residue producers generally cannot guarantee a long-term supply. This can impose severe risks on potential customers.

It may be assumed that the cost of disposal of certain wastes also has a positive influence on the extent of the activity of waste exchanges and on their success. With rising costs of the disposal of certain residues, the willingness of the waste generators to offer their residues through waste exchanges and to take measures in the production process which facilitate the sale of these residues through waste exchanges will also grow.

It has to be noted, however, that conditions favourable to waste exchanges do promote internal recycling, too. Investigations in this field show that internal recycling plays already an important role particularly in bigger, well equipped firms with a broad financial basis and a high quantity of potential wastes, bigger firms generally being better prepared to translate new developments on the market into investment decisions. This could handicap waste exchange in the long run and limit their field of operation to small firms only, with all the handicaps of poor and uncertain supply of residues. On the other hand high specialization within industries puts a natural limit to internal recycling thus leaving a niche for waste exchanges.

Summarizing, it can be said that the success of waste exchanges depends mainly on external factors. In this connection, the scientific-technical development of the process of recycling of industrial residues plays a crucial role.

6. Liability, Insurance, Financing

None of the present laws on the disposal of hazardous wastes deal in detail with questions of liability.

The disposal of hazardous wastes may involve risks the extent of which can hardly be determined in advance. While in the case of treatment procedures the source of the danger is localized and the risks can be controlled, specific problems with regard to liability arise in the case of landfill sites:

- liability for recultivation
- liability for the costs of long-term safety measures
- liability for major damage even after the closure of the site (e.g. ground water pollution).

The liability problems vary for the cases mentioned depending on whether they concern risks involved in the maintenance and operation of landfill sites or those which continue after the closure of the site.

The risks during the operation can be taken into account to a large extent by imposing conditions on granting the licence.

When granting a licence for a disposal facility, it should be ensured that the operator has enough liability capital.

Another possibility is to compel operators to take out adequate insurance. In this case the problem is that it is difficult for the insurance companies to assess the existing risks and that they will therefore not always be willing to conclude contracts at reasonable conditions.

Another possibility is the creation of a fund or the obligation to build up reserves to cover the risk.

After the closure of landfill sites for the disposal of hazardous wastes, additional problems may arise, especially under the aspect of prescription of periods of liability. Such questions are the subject of the US subproject "Recommended Procedures of Hazardous Waste Management", topic Long-Term Care.

As to financing it can be said that there are no general principles common to all participating countries. It is obvious that government grants are very often given in a more or less direct way.

Particularly all countries which are in an advanced stage of hazardous waste organization or trying to build up a centralized and uniform system tend to give government loans or subsidies. This is admittedly the case in the Federal Republic of Germany, Denmark and France.

Financial support from public bodies is not only limited to countries with a strong government involvement. Where hazardous waste disposal tends to organizational forms with direct government control (i. e. facilities run by public bodies) financial aids are even more substantial.

It has to be noted, however, that the reports of countries where there is a definite reluctance towards too much government interference show that these countries have to face severe difficulties not only to build up a comprehensive disposal system, but also in getting financing problems settled without a legally binding obligation forcing waste producing industries to contribute financially to the establishment of facilities.

Some countries (France, Belgium) try to solve the problem of financing by introducing a scheme of taxation of waste producers or of products causing waste thus building up funds to finance hazardous waste management measures. It is too early to give an evaluation of these schemes which are still matter of considerations in those countries.

As a general result of the evaluation of the national reports, it can be said that in none of the participating countries the problems of financing have been solved without either direct or indirect government grants or subsidies or by means of legislation dealing with this problem alone.

This leads to the conclusion that financing of hazardous waste management seems to be impossible on a strictly voluntary basis if a comprehensive solution of management problems is envisaged. It also seems unlikely that the problem of financing can be solved by means of strict regulations only unless these regulations provide an organizational pattern too or unless public bodies are prepared to supply facilities.

7. Special Regulations for Certain Kinds of Waste

The national reports show that there are only few countries where special regulations for certain types of waste have yet been implemented.

The only exception to this rule are countries which had already special regulations before general legislation on the hazardous waste issue was enforced (for example Federal Republic of Germany, Denmark for waste-oil).

The general approach of the participating countries rather seems to be to supply a general comprehensive management scheme for all hazardous wastes than to start with building up management systems for single groups of waste.

This does not mean, however, that there will not be any special regulations for wastes like hardening salts, solvents or waste oil. Regulations for these types of waste are prepared in Belgium, in the Netherlands the CWA provides already a framework for waste-oil management and Codes of Practise exist in the UK.

It can be recommended that it should not be regarded as a question of principle to implement special legislation and special organization for single wastes. In fact it seems much more appropriate to deal with these wastes within a general framework of hazardous waste legislation and management for reasons of simplicity and comprehensiveness although it might be necessary in certain cases to provide special organization forms for collection and storage of these wastes.

IV. Conclusions and Recommendations

A. Conclusions

The possibilities of establishing certain organizational forms for the disposal of hazardous wastes have to consider the constitution, the legal system and the political objectives of the country concerned.

Adequate waste disposal requirements (standards) on a national level are of extraordinary importance for the organization of hazardous waste disposal. Such standards would i. a. facilitate control measures, as licensing of facilities, and help to improve planning as well as financing.

The organization of the disposal of hazardous waste will often be improved by central disposal facilities with a large capability.

The control of transport processes is of special importance.
The disposal of hazardous wastes and the operation of disposal facilities is not, in principle the responsibility of the government; the waste-generating industry as well as private enterprises have to take over important tasks in this field.

Even if waste disposal is organized on a private basis, it may be necessary for government or government-controlled facilities to be available, if the capacity of the private system proves to be inadequate.
The classification of hazardous wastes is of importance for the organization of their disposal as a basis for planning and control.

The financing of facilities for the disposal of special wastes constitutes a problem, irrespective of the ownership of these facilities. This problem can be solved by the provision of financing concepts. Their financing from general budgetary funds only appears justified in exceptional cases.

Based on the polluter-pays-principle the following concepts of financing seem possible:

a) financing by the operator

b) financing by industries, also by joint ventures (industry-owned facilities)

c) financing by public and/or private bodies using a fund supplied with payments from waste producers or other sources

Private investments for facilities can only be expected when there is a accessible "market" for such facilities and when the use of such facilities is either enforced by legislative measures or acceptable for the waste producers at fees which guarantee a profit of the operator.
Legal enforcement of obligatory use of licensed facilities can be regarded as a strong means in encouraging financing of facilities out of private sources.
From the point of view of liability and safety, the size of the capital of disposal enterprises is of special importance. These aspects can also be taken into account by imposing the obligation to take out insurance or by other appropriate measures, such as performance bonds.
The problems of financing the long-term control of landfill sites for hazardous wastes are still largely unsolved and should be clarified.

B. Recommendations

A harmonization of technical and safety standards for waste disposal on the international level would help international cooperation in this field and should therefore be envisaged.

Waste reduction and utilization should have priority over waste disposal. Disposal should only be chosen if the first two possibilities do not exist or are economically unreasonable. This requirement should be taken into consideration in all governmental measures.

An essential task is the planning of the disposal system. Government should play an active role in the planning process either by participating in it or by regulating it. Planning should be carried out in close liaison between the authorities responsible for the disposal of hazardous wastes, the disposal enterprises and the interested groups from industry and with regard to disposal of other general wastes.

The planning of sites for facilities for the disposal of hazardous wastes should at least be undertaken on a regional basis. The preparation of individual plans should take account of overall planning requirements.

For facilitating disposal of hazardous wastes in wide areas, the establishment of collection centres should be considered. Due regard has to be given to the fact that the establishment of collection centres might increase overall costs of disposal. Some of the collection centres should be equipped with facilities for pretreatment. The transport costs can be reduced by a reduction in volume or weight at the collection centres.

The disposal of hazardous wastes requires controls by government authorities. Controls should extend to the licensing and verification of facilities and to the final disposal of the wastes.

The method of implementation of legislative measures on control issue has to relate to whether organization is carried out by private enterprise or by public bodies, i.e. external control by legislation measures will have to be more formal in case of private initiative organizations whereas control of public bodies should be oblainable by means of internal control.

When licences for waste disposal facilities are granted, the restoration or stabilisation of the utilized terrain after closing of the facility should be provided for appropriate measures, to avoid as far as possible that the costs of restoration or stabilisation have not to be borne by the public.

Among the possible measures for the control of the disposal of wastes, controls at the source (i.e. control of waste generation) should be given priority.

"Waste exchanges"are an effective organizational means to increase the utilization of industrial residues. Their establishment, maintenance and effectiveness should be encouraged by appropriate measures. Any direct government involvement with the organization and operation of waste exchanges must take appropriate regard of confidentiality aspects.

Financing is strongly linked to organizational legislation on forms of organization, i.a. ownership of facilities, aereal coverage of facilities and on control measures. It has thus to be borne in mind that these marginal conditions must fit into the concept of financing.

Taking into consideration an organizational scheme based on facilities run by public bodies due regard should be paid that the polluter-pays-principle is maintained.

The prices charged for the disposal of hazardous wastes should be based on the disposal costs including investment amortization and long term care. Possibilities to achieve equal price levels should be utilized in order to compensate for site disadvantages where appropriate to the particular country's attitude.

Subsidized disposal prices should only be envisaged in strictly limited cases, for example, to introduce new technologies or for research purposes. The possibilities to grant low-interest loans for investments however should be exhausted.

In order to avoid site disadvantages and to equalize disposal costs, the cost of transport from the collection centres to the disposal facilities should be included in the disposal costs where appropriate to the particular country's attitude.

To avoid restrictions in the field of transfrontier waste transport and disposal, comparable requirements should be envisaged in the different countries.

Sites based on particularly favourable nature should be (also internationally) made available not regarding the origin of wastes - but with due regard to the cooperative principle. This requires close cooperation of state authorities both on a national and international level subject to limitation of capacity and the avoidance of unnecessary long transportation.

Annex 1

Legal Material Communicated for the Report on "Organization"

Belgium

Loi sur le déchets toxiques du 22 juillet 1974,
Moniteur Belge 1975, 2365
(Act on Toxic Waste, 22 July 1974, State Journal 1975, 2365)
Arrêté royal du 9 Fevrier 1976 portant règlement général sur
les déchets toxiques,
Moniteur Belge 1976, 1650)
(Royal decree of 9 Febr. 1976 regulating toxic waste disposal
in general,State Journal 1976, 1650)

Denmark

1. Lov om bortskaffelse m.v. af olie-og kemikalieaffald,
   Lov nr. 178 af 24. maj 1972
   (Law on the Disposal of Waste Oil and Chemical Waste
   Act No. 178, 24 May 1972)
2. Lov om miljøbeskyttelse, Lov Nr. 372 af 13. juni 1973
   (Environmental Protection Act - Act No. 372, 13 June 1973)
3. Bekendtgørelse om bortskaffelse m. v. af olieaffald,
   Ministeriet for forureningsbekoempelse nr. 455 af
   17. oktober 1972
   (Statutory Order on Waste Oil Disposal, 17 Oct. 1972,
   Dept. of the Environment No. 455)
4. Bekendtgørelse om kemikalieaffald, Miliøministeriets
   bekendtgørelse nr. 121 af 17 marts 1976
   (Statutory Order on Chemical Waste, 17 March 1976,
   Dept. of the Environment No. 121)

Federal Republic of Germany

1. Abfallbeseitigungsgesetz (Waste Disposal Act) 7 June 1972,
   BGBl. I, 873 amended by Act for Amendmend of the Waste
   Disposal Act 21 June 1976, BGBl. I, 1601, including a
   definition for special wastes.

2. Administrative Order on Notification of Wastes
(Abfallnachweisverordnung) 29 July 1974, BGBl. I, 1574

3. Administrative Order on Collection and Transport of Wastes
(Abfallbeförderungsverordnung) 29 July 1974, BGBl. I, 1581

4. Administrative Order on Transport of Wastes
(Abfalleinfuhrverordnung) 29 July 1974, BGBl. I, 1584

5. Administrative Order on Special Wastes
(Verordnung zur Bestimmung von Abfällen nach § 2 Abs. 2 des Abfallbeseitigungsgesetzes) 24 May 1977, BGBl. I, 773

6. Altölgesetz (Waste Oil Act) with amendments
23 Dec. 1968, BGBl. I, 1419
1st Administrative Order on the Waste Oil Act,
21 Jan. 1969 BGBl. I, 89
2 nd Administrative Order on the Waste Oil Act,
2 Dec. 1971, BGBl. I, 1939

France

1. Loi No. 75-633 relative à l'élimination des déchets et à la récupération des matériaux
(Act No. 75-633 on Waste Disposal and Recovery 15 July 1975, Official Journal 16 July 1975).

2. Projet de décret fixant la liste des catégories de déchets visée à l'article 8 de la loi no. 75-633 du 15 juillet 1975
(Statutory Regulation on a list of Wastes According to Art. 8 of Act No. 75-633-Draft).

3. Projet de décret de procédure pris en application de l'article 8 de la loi no. 75-633 du 15 juillet 1975
(Statutory Regulation on the Procedure According to Art. 8 of Act no. 75-633-Draft).

4. Décret no. 76-472 du 25 mai 1976 portant création du comité national pour la récupération et l'élimination des déchets
(Statutory Regulation No. 76-472 on the Establishment of a National Committee for Waste Disposal and Recovery 25 May 1976, Official Journal 2 June 1976.

5. Décret no. 76-473 du 25 mai 1976 relativ à l'Agence nationale pour la récupération et l'élimination des déchets
(Statutory Regulation No. 76-473 on the National Agency for Waste Disposal and Recovery 25 May 1976, Official Journal 2 June 1976).

Netherlands

Wet chemische afvalstoffen (Chemical Waste Act) Stb. 1976, 214, begin of implementation of this act can be expected in 1977 together with Statutory Regulations being prepared under it (e.g. Stoffenen processenbesluit, list of materials and processes).

United Kingdom

1. Deposit of Poisonous Waste Act, 30 March 1972
2. The Deposit of Poisonous Waste (Notification of Removal or Deposit) Regulations 1972, SI 1972 No. 1017
3. Control of Pollution Act, 31 July 1974 (Part I).
4. The Control of Pollution Act (Commencement order No. 5)), Order 1976, SI 1976 No. 731 (C 21)
5. The Control of Pollution (Licensing of Waste Disposal) Regulations 1976,SI 1976 No. 732

United States of America

I. Federal

1. Resource Conservation and Recovery Act of 1976, Public Law 94-580, enacted October 21, 1976

II. State

1. California: Hazardous Waste Act, Calif. State Statutes 1972, Vol. 1 p. 2387 - 2393

2. Minnesota: Act Regulating the Details of Hazardous Waste Control etc., Senate Bill 1974 No. 3193

3. Maryland: Act Concerning Natural Resources-Safe Disposal of Hazardous Substances, Senate Bill, 1974, No. 977

4. Oregon: Environmentally Hazardous Wastes ORS 459.410-459.690

5. Washington: Act Relating to Hazardous Wastes, Substitute Senate Bill 2038, passed March 10, 1976.